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MARINE SEISMIC DISPLAY ENHANCEMENT PROGRAM. VOLUME III. USERS H--ETC(U)
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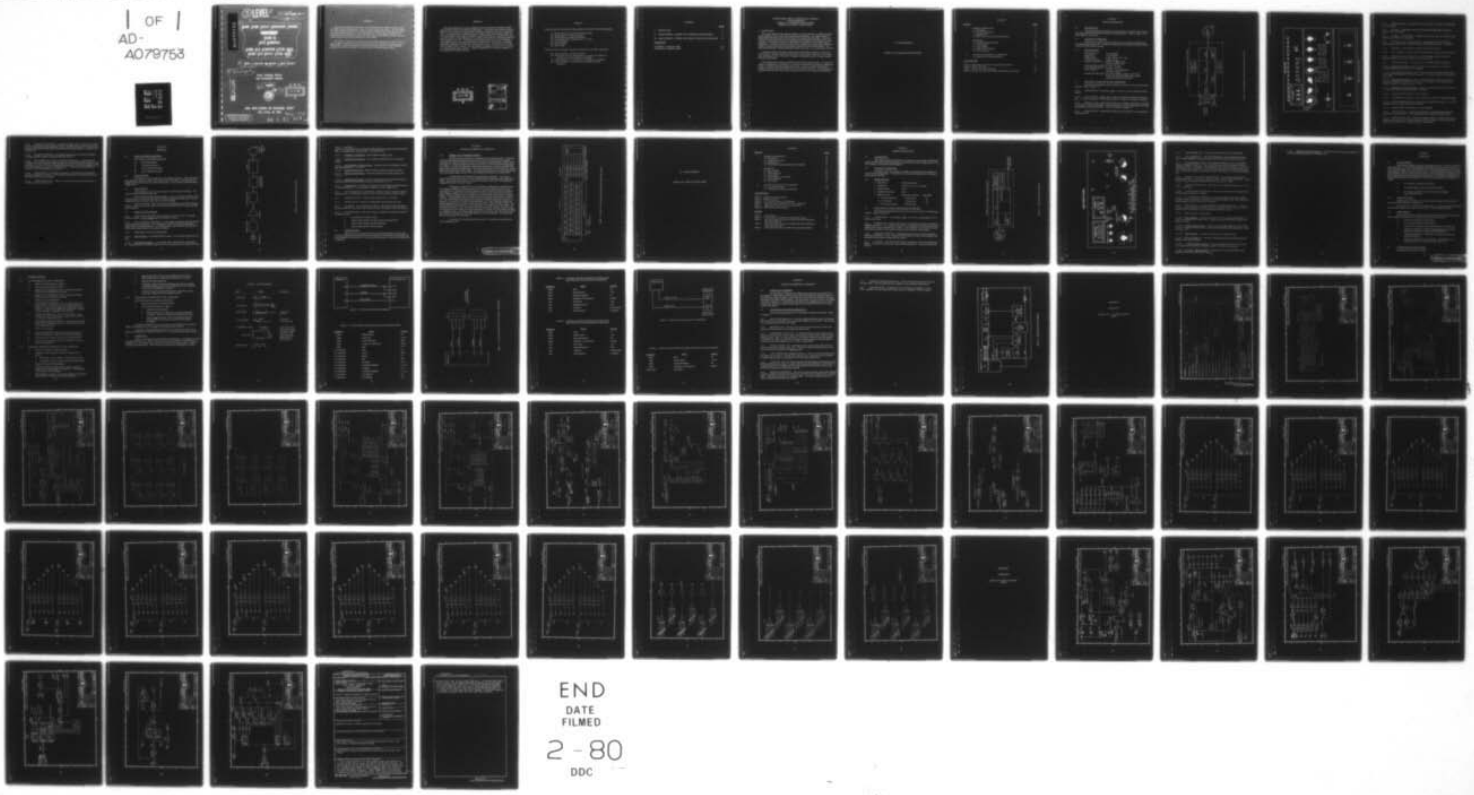

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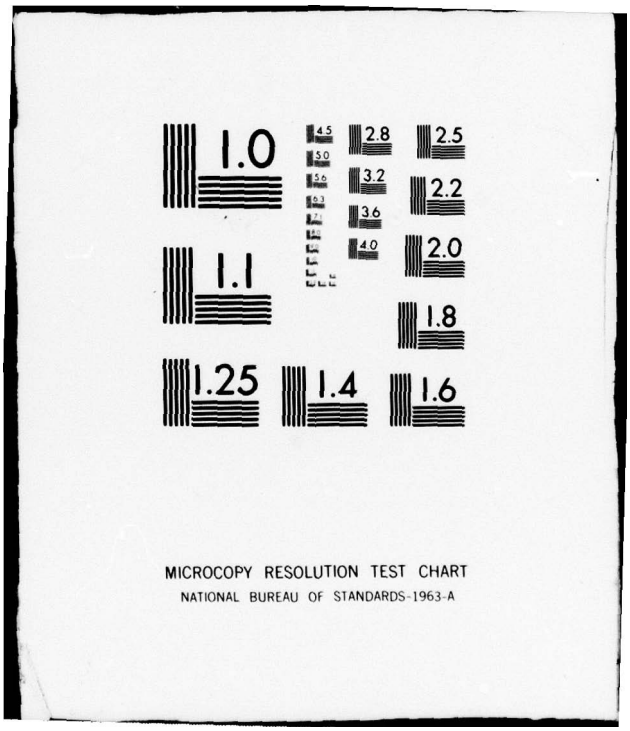
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MARINE SEISMIC DISPLAY ENHANCEMENT PROGRAM.

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VOLUME III.
USERS HANDBOOKS,

SEISMIC DATA ACQUISITION SYSTEM (SDAS),
SEISMIC DATA DISPLAY SYSTEM (SDDS).

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FOREWORD

This report describes the operation of the instrumentation developed to digitally record and display seismic profiling data. There are two sections to this report. The first section is a users handbook which describes proper operation techniques for the Seismic Data Acquisition System (SDAS) hardware. The second section is a users handbook describing the proper operation techniques for the Seismic Data Display System (SDDS) hardware. Included in this report are the circuit schematics for each system.

This report is Volume III of the Marine Seismic Display Enhancement Program Final Report. Volume I presents a summary of project results with examples of processed seismic profiling data. Volume II describes the processing software programs and the operating procedure for their use on either the Univac 1108 or CDC 6600 computer system.

ABSTRACT

This report describes in a users handbook format the operation of hardware systems used to acquire and play back seismic profiling data. The Seismic Data Acquisition System digitizes 1 to 16 channels of analog seismic information and records this data on magnetic tape. This digital data has a maximum dynamic range of 72 dB and maximum sample rate of 10 KHz divided by the number of channels. Record lengths up to 15 seconds with a maximum record delay, before digitizing, of 15 seconds may be selected. Maximum signal level for the system is ±10 volts. The Seismic Data Display System converts a 36 dB dynamic range digital signal to an analog signal having a maximum level of ±10 volts. The digital information displayed will contain 1977 data points per record. The system has the capability to display seismic data on a line scan intensity modulated recorder, an x-y recorder, or a high speed fiber optic recorder. Included as appendices are schematic diagrams of the acquisition and display hardware.

PREFACE

These systems were developed and documented by the efforts of the following people:

Mr. Charles Stockton (currently with NAVOCEANO)
Mr. Thomas Mero (currently with NOAA)
Mr. Phillip Libraro (currently with NOAA)
Mr. Frank Stookesbury (currently with U. S. Army)
Mr. Frank Carnaggio
Mr. Bruce Eckstein
Mr. Martin Fagot

The editors wish to recognize the specific contribution of the above individuals.

Mr. Charles Stockton - Design of the SDAS
Mr. Thomas Mero and Mr. Phillip Libraro - Design of the SDDS and and preparation of the SDAS Users Handbook
Mr. Frank Stookesberry - Preparation of the SDDS Users Handbook
Mr. Frank Carnaggio - System checkout and updating systems schematics

CONTENTS

MARINE SEISMIC DISPLAY ENHANCEMENT PROGRAM
USERS HANDBOOKS
SEISMIC DATA ACQUISITION SYSTEM (SDAS)
SEISMIC DATA DISPLAY SYSTEM (SDDS)

I. INTRODUCTION

This report consists of two separate sections. The first section is a handbook describing the operation of the Seismic Data Acquisition System (SDAS). The second section is a handbook describing the operation of the Seismic Data Display System (SDDS). These two instruments were developed to provide geophysical instrumentation with sufficient accuracy, resolution, and frequency response to allow detailed investigation of sub-bottom acoustic propagation. The SDAS acquires the information in a digital format which allows application of filter and deconvolution processing software through a central computer facility. The SDDS allows playback of the processed data through a line scan, x-y, or fiber optic recorder.

The SDAS provides a maximum sample rate of 10 KHz with a maximum of 15-second record lengths. The SDAS also has a maximum of 72 dB dynamic range and a ±10 volt maximum signal input voltage. The system is capable of digitizing from one to sixteen separate channels of information.

The SDDS provides a display of digital data having 36 dB dynamic range. The system is capable of displaying this information in an intensity modulated line scan format, wiggle trace format, or intensity modulated wiggle trace format. A half wave filled wiggle format is available through an experimental interface for the fiber optic recorder. An operational configuration of this interface had not been completed at the time this handbook was published.

II. USERS HANDBOOK

SEISMIC DATA ACQUISITION SYSTEM (SDAS)

CONTENTS

ILLUSTRATIONS:

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

This section provides information on the operation of the Seismic Data Acquisition System (SDAS), which includes elementary setup procedures. Refer to Figure 1 for a block diagram of the system.

1.2 CONCEPT OF OPERATION

Seismic Data Acquisition System (SDAS) provides a facility for digitizing and recording marine seismic data. The data is formatted for processing on either the UNIVAC 1108 or CDC 6600 computer system.

1.3 SPECIFICATIONS

ANALOG INPUT:	1 to 16 channels
MAX INPUT:	±10 volts peak
RESOLUTION:	11 bit + sign or 5 bit + sign
DYNAMIC RANGE:	72 dB or 36 dB
SAMPLE FREQUENCY:	200 Hz to 10 KHz (12 bit) 200 Hz to 20 KHz (6 bit)
DATA RECORD LENGTH:	0.5 sec. to 15 sec.
DATA RECORD DELAY:	0.4 msec. to 15 sec.
TAPE FORMAT:	UNIVAC or CDC compatible 7 channel, 556 BPI
HEADER INFORMATION:	Day, time, sample frequency, data record length, and data record delay, plus 15 BCD switches for additional annotation

1.4 SDAS FRONT PANEL FUNCTIONAL DESCRIPTION

The following paragraphs briefly describe the function of each of the front panel controls. (Refer to Figure 2.)

1.4.1 POWER SWITCH. Two position toggle, ON and OFF, powers SDAS logic mainframes.

1.4.2 FILE COUNTER. Digital readout counter that counts the number of records on tape. A record corresponds to a shot-return sequence. (Number not recorded on header.)

1.4.3 DIGITAL CLOCK. Digital readout of day, hour, minute, and second is recorded for each shot as header information. The clock provides a 100 KHz signal used by the SDAS as the master system internal clock. (Clock is not shown in Figure 2.)

1.4.4 ANALOG INPUTS. Sixteen BNC connectors are provided for 1 to 16 channels of analog input data.

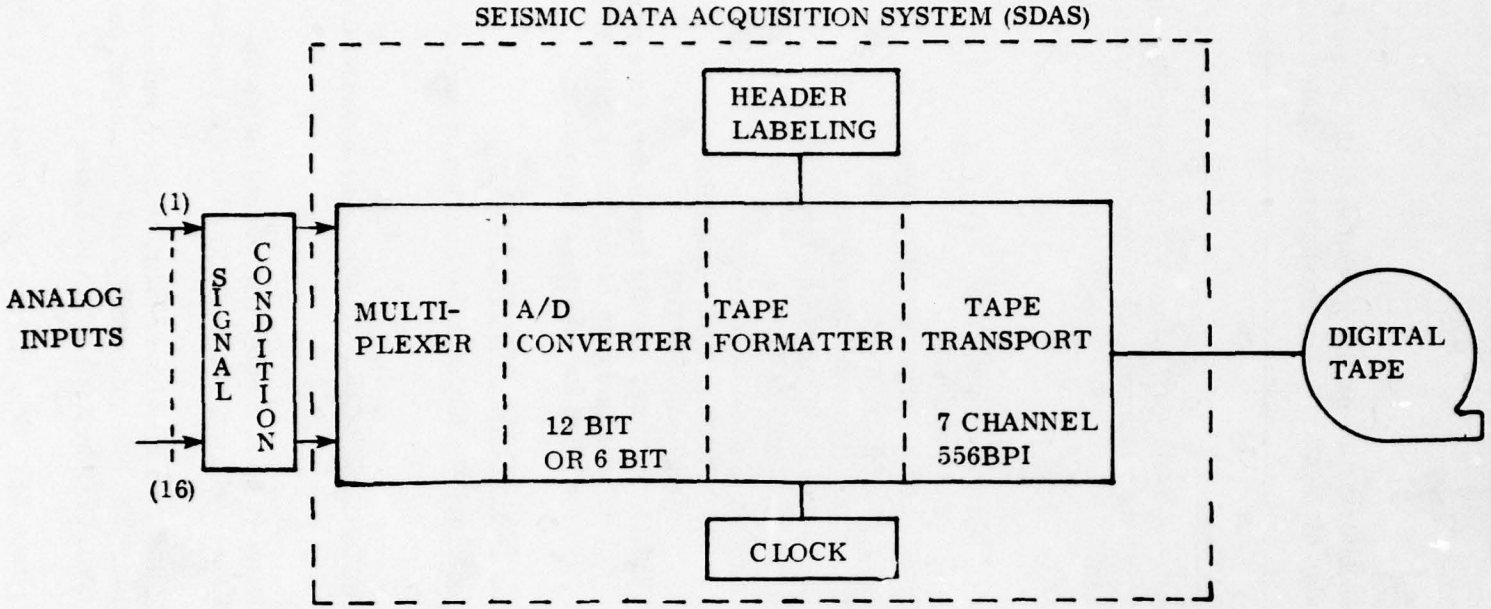


Figure 1. Block Diagram of Seismic Data Acquisition System.

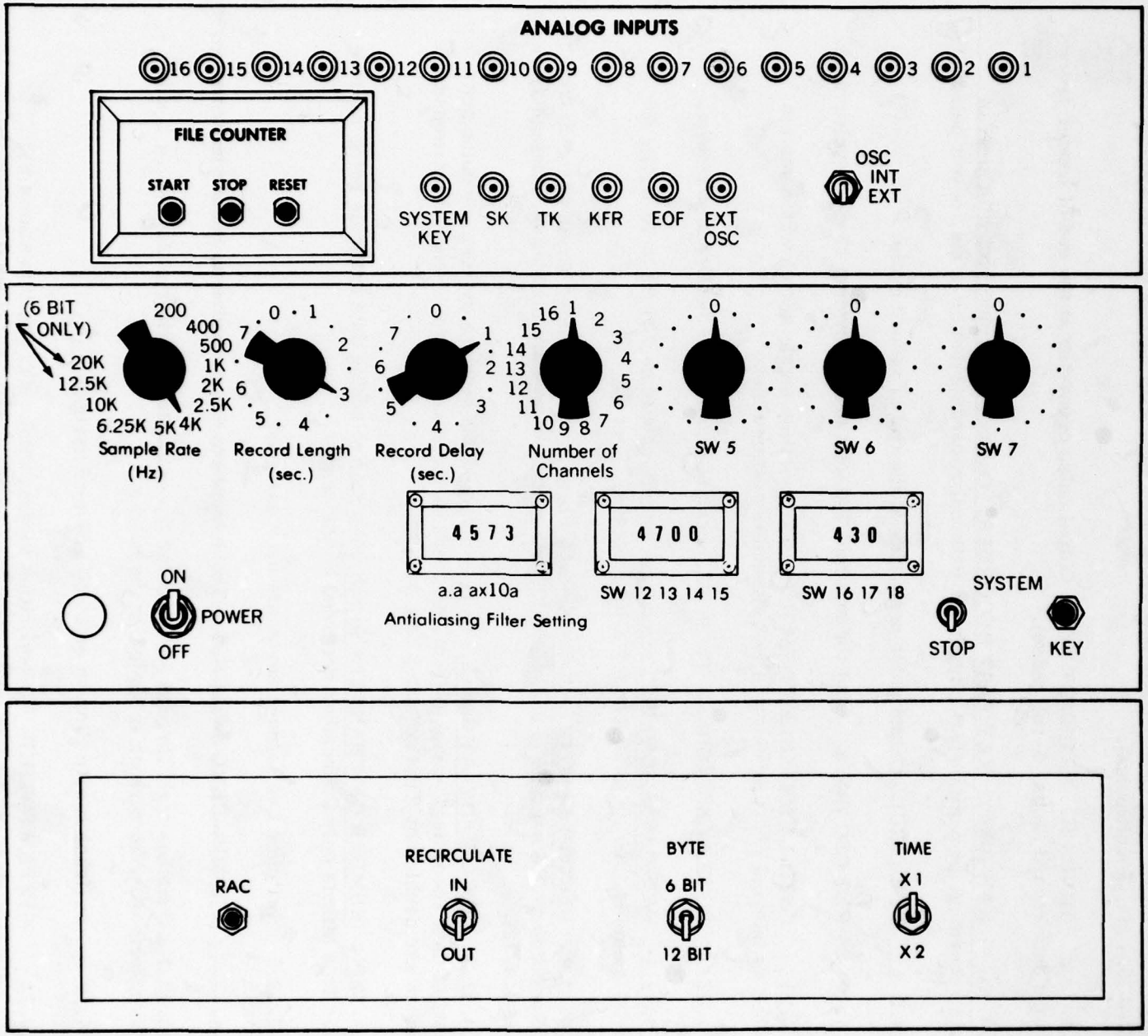


Figure 2. SDAS Front Panel

1.4.5 SYSTEM KEY (BNC). External system key input pulse (triggers on leading edge of a 5-volt pulse).

1.4.6 SK (BNC). Output pulse occurring coincident with leading edge of system key pulse (0.4 ms, 5-volt pulse).

1.4.7 TK (BNC). TRANSMIT KEY. Output pulse occurring at the end of header record before data record (2 ms, 5-volt pulse).

1.4.8 KFR (BNC). KEY FAST RECORDER. Output pulse coincident with start of data recording, providing start trigger for external recording device (2 ms, 5-volt pulse).

1.4.9 EOF (BNC). Output pulse occurring at the end of record cycle.

1.4.10 EXT OSC (BNC). Input for external 100 KHz master system clock (5-volt pulse).

1.4.11 OSCILLATOR SELECT SWITCH. Two-position toggle switch which selects either an internal (INT) or external (EXT) master system clock.

1.4.12 ROTARY SWITCHES. These numbers are recorded as header information.

1.4.12.1 SAMPLE RATE Switch. Selects a sample rate from 200 Hz to 10.0 KHz for 12-bit samples, 200 Hz to 20 Khz for 6-bit samples.

1.4.12.2 RECORD LENGTH Switch. Selects a digitized data record length variable from 0.5 seconds to 7.5 seconds in 0.5-second increments. Values are doubled by Timing Switch (see 1.4.19).

1.4.12.3 RECORD DELAY Switch. Selects a time delay between system key pulse and start of data recording, variable from 0 seconds to 7.5 seconds in 0.5-second increments. Values are doubled by Timing Switch (see 1.4.19).

1.4.12.4 NUMBER OF CHANNELS Switch. Number of analog data channels being recorded. This affects only the number recorded on the header.

1.4.12.5 Switches five through seven are user assigned.

1.4.13 THUMBWHEEL SWITCHES. These numbers are recorded as header information.

1.4.13.1 Switches eight through eleven enter the anti-aliasing filter setting ($a\ .a\ a \times 10^{a4}$). This affects only the number recorded on the header.

1.4.13.2 Switches twelve through eighteen are user assigned.

1.4.14 SYSTEM SWITCH. Two-position toggle switch. ON position allows SYSTEM KEY pulses to start the system. STOP position allows no external system key pulses.

1.4.15 SYSTEM KEY BUTTON. Momentary pushbutton switch. Internally keys the system at any time even when the SYSTEM switch is in the STOP position. (Do not press when system is in recording cycle as record contains erroneous data.)

1.4.16 DYNAMIC RANGE SWITCH. Two-position toggle switch. Must be set for either 6 bits or 12 bits dynamic range (normally 12 bits). Dynamic range must also be set on A/D converter (Miniverter System) SHORT CYCLE Switch for proper operation. (Labeled BYTE on Figure 2.)

1.4.17 RECIRCULATE SWITCH. Two-position toggle switch: IN and OUT positions. IN position initiates recorder recirculate mode (see 2.4.3.2).

1.4.18 RAC PUSHBUTTON. READ A CHARACTER pushbutton. In the READ mode (formatter unit), this pushbutton enables the operator to read the information written on tape, a character at a time. Each time the pushbutton is pressed, a 6-bit word is displayed on six LED's (mainframe row 2, card 36, energized being a "1" state and de-energized being a "0" state). For bit interpretation, see Figure 4.

1.4.19 TIMING SWITCH. In NORMAL (X1) position, RECORD DELAY and RECORD LENGTH are labeled on the panel. In the EXPAND (X2) position, the RECORD DELAY and RECORD LENGTH times are doubled.

1.4.20 PARITY ERROR LIGHT. LED is lit if a parity error occurs in the process of recording (not shown on Figure 2).

SECTION 2

OPERATION

2.1 INITIAL POWERING PROCEDURE

Turn on power in the following sequence:

(a) SDAS system power

(b) A/D Miniverter power

(c) TAPE FORMATTER power

(d) TAPE TRANSPORT power

2.2 ANALOG INPUTS

See Figure 3 for basic signal flow in recording seismic data. Assure the analog input signals are within the range of ±10 V with a zero volt DC offset. The inputs are DC coupled to the Miniverter and a DC offset will bias data. Do not overdrive individual filters' voltage levels.

2.3 TAPE LOADING

Before loading, be sure the reel of tape has a WRITE RING on the back. The system will not record without this ring.

Load a full reel of tape on bottom spindle. Press in the center of spindle to lock the reel in place. Thread tape according to the diagram printed on the tape deck. Be sure enough tape has been wound on empty reel to assure no slipping.

Press LOAD button. Tape will advance to the Beginning of Tape (BOT) marker and halt. Ensure that the RING light is on which indicates WRITE RING is in place and tape can be recorded.

2.4 BASIC CONTROL SETTINGS

2.4.1 TAPE FORMATTER MODE Switch (DIGIDATA MODEL LC 0117). Set mode switch to RECORD. (Do not change mode while system is on line.)

2.4.2 ANALOG/DIGITAL MINIVERTER. Set the number of channels used (end channel) and the channel to be displayed. These switches are coded in octal with 00 indicating 1 channel and 10 indicating 9 channels. The sampling rate on each channel is the SAMPLING RATE switch setting divided by the number of channels.

2.4.3 SDAS FRONT PANEL AND MAINFRAME

2.4.3.1 SYSTEM Switch. Set SYSTEM Switch to STOP. An EOF mark is ready to go on tape.

2.4.3.2 RECIRCULATE Switch. At slow sample rates, (below 1 KHz), turn switch to IN. The tape recorder will stop if a parity error is encountered and try to rewrite the error

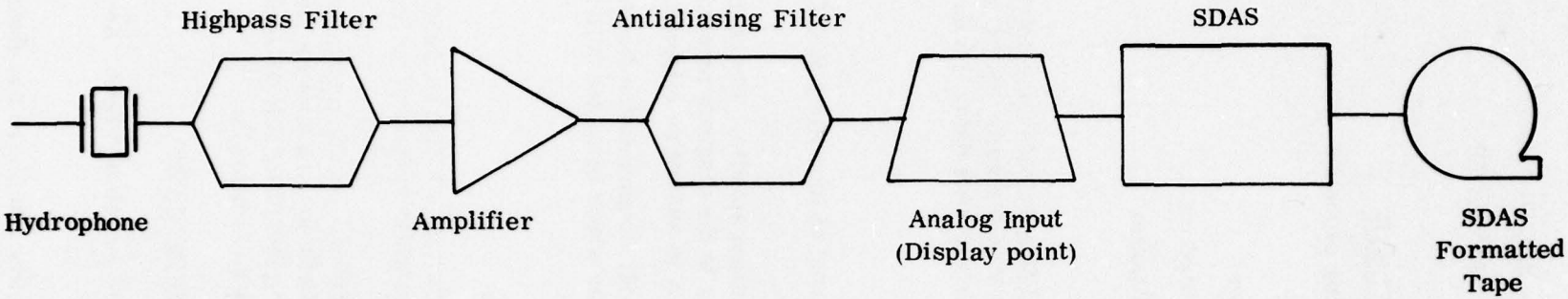


Figure 3. Seismic Data Recording Setup

2.4.3.2 (continued)
record. If the error persists, the PARITY ERROR light will energize and the system will stop. For sample rates 1 KHz and above, turn switch to OUT.

2.4.3.3 NUMBER OF CHANNELS. Set the number of channels used.

2.4.3.4 DYNAMIC RANGE Switch. Set to number of bits desired (6 or 12 bits) per sample.

2.4.3.5 ANTIALIASING FILTER SETTING. Place filter value in thumbwheel switches eight through eleven (a .a a x 10^{a}).

2.4.3.6 SAMPLE RATE Switch. Select the desired sample rate (Hz) for the data.

2.4.3.7 RECORD LENGTH Switch. Select the desired record length (seconds) (see 2.4.3.9).

2.4.3.8 RECORD DELAY Switch. Select the desired time delay (seconds) between the system key pulse and the beginning of the data recording (see 2.4.3.9).

2.4.3.9 TIMING Switch. In NORMAL (X1) position, record length and record delay are as read from the panel. The (X2) position multiplies the time readings by two.

2.4.4 TAPE TRANSPORT ON LINE SWITCH. Depress to place recorder on line (on line light is on). The SDAS file counter will reset to one and an EOF is written on tape.

2.4.5 SYSTEM KEY INPUT. Adjust system key input for a 5-volt pulse.

2.4.6 SYSTEM INPUTS. Connect the analog inputs and the system key input.

2.4.7 RECORDING. Turn SYSTEM key switch up. The SDAS will start recording keyed by system key input and the FILE counter will count the number of records recorded.

2.4.8 STOP RECORDING. When the recording is complete, deactivate the system in the following order:

1. Set SYSTEM key switch to STOP.
2. Depress tape transport ON LINE switch (on line light off).
3. Depress tape transport REWIND pushbutton.
4. Remove analog and SYSTEM key inputs.

2.5 POWERING DOWN

There is only one critical step that must be performed before powering down. The tape transport must be taken off line first; depress ON LINE switch (ON LINE light off). If tape transport is not off line first, it causes the tape transport to rewind in an illegal mode of operation.

SECTION 3

CONCEPT AND THEORY OF OPERATION

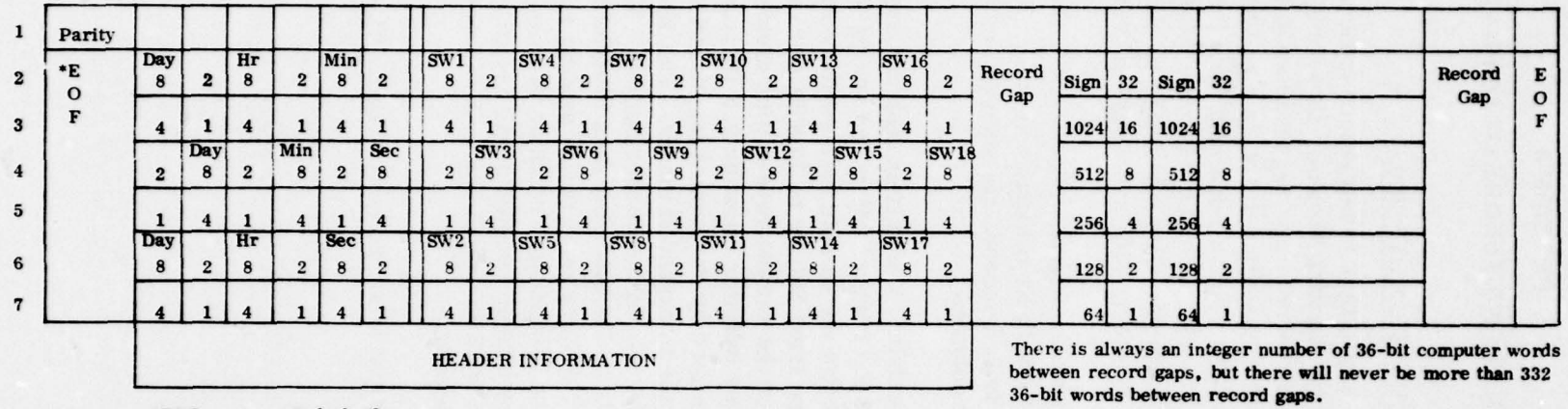
3.1 SEISMIC DATA ACQUISITION SYSTEM

The SDAS system is keyed by a 5-volt pulse on the system key input. In the case of seismic data this pulse would be the time break or shot time of the air gun or sparker. Once keyed, the system sequentially writes an 18-character (6 bits/character) header record (see Figure 4). These characters are written at the rate of 50 KHz which takes approximately 0.4 msec. The first six characters contain date and time (hour, minutes, seconds) information from the system's digital clock. The next two characters are the sample rate, record delay, and record length switch settings. The remaining 10 characters are the switch settings of 15 BCD switches which may be used to code additional information on the tape header.

A sample delay counter begins counting following the header. This counter counts from 0 to 15 counts in 0.5 Hz (1 Hz if expanded) pulses depending on the sample delay switch. Delays from 0 seconds to 7.5 seconds (15 seconds) can be used to avoid sampling unwanted data such as the water column.

Following the sample delay, the system begins sampling data sequentially from 1 to 16 channels, depending on the end channel set on the analog to digital (A/D) converter. The sample rate is determined from the sample rate switch setting and number of channels being sampled. Sample rates are from 200 Hz to 10 KHz (for one channel and 12-bit sampling). The data sampling rate is the sample rate setting divided by the number of channels sampled. A record length counter initiates counting 0.5 Hz pulses following the record delay. The record length is determined by the record length switch which can be set from 0.5 seconds to 7.5 seconds (15 seconds in expanded mode). The 12-bit amplitude samples are loaded sequentially into one of the two tape recorder buffers. When the buffer is filled with 996 data samples (1992 characters), the incoming data is switched to the second buffer. The first buffer is written on tape. This ping-pong buffer system allows higher recording rates. At the end of the record length the system will continue to sample until the number of samples is a multiple of three. This allows rapid reading of the records into the 1108 computer which has a 36-bit word length or the CDC 3800 which has a 48-bit word length. The last record will contain less than 1992 characters.

An End of File is written after the last record. The system is now ready to receive another key pulse.



There is always an integer number of 36-bit computer words between record gaps, but there will never be more than 332 36-bit words between record gaps.

*EOF = End of File

**DDR = Digital Data Record

Figure 4. Seismic Data Acquisition System (SDAS) Data Tape Format.

III. USERS HANDBOOK

SEISMIC DATA DISPLAY SYSTEM (SDDS)

CONTENTS

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

This section provides information on the operation of the Seismic Data Display System (SDDS), which includes elementary setup procedures for three display devices. Refer to Figure 1 for the System Block Diagram.

1.2 CONCEPT OF OPERATION

The basic function of the SDDS is to display in an analog format computer processed seismic profiling data. The SDDS can key the selected output device or the output device can key the SDDS.

1.3 SPECIFICATIONS

1.	Data points	1977 pts per sweep	
2.	Sweep Rates	0.25, 0.5, 1, 2, 5, 10 seconds	
3.	Dynamic Range	36 dB	
4.	Amplitude Resolution	6 bits	
5.	Display Devices	Max sweep resolution	Trace width
	a. Line Scan Recorder	160 lines/inch	19"
	b. X-Y Recorder	64 lines/inch	10"
	c. Fiber Optic Recorder	200 lines/inch	5"

1.4 FRONT PANEL FUNCTION DESCRIPTION OF THE SDDS

The following paragraphs briefly describe the function of each of the front panel controls. (Refer to Figure 2.)

1.4.1 POWER SWITCH. A two-position toggle, OFF and ON, which applies AC line power to the system.

1.4.2 COMPARATOR. Positions digital tape at the selected record when COMPARE pushbutton pressed. A "LO" indicator, red LED dot, is illuminated when the present record number is less than the desired record number. A "HI" indicator, red LED dot, is illuminated when the present record number is greater than the desired record number.

1.4.3 COMPARE PUSHBUTTON. Initiates positioning of tape to record selected by COMPARATOR (Section 1.4.2). The tape will stop at the end of the record indicated by the thumbwheel switch ready to display the next record.

1.4.4 COUNTER. The bi-directional counter indicating the current record being displayed. This counter contains start, stop, and reset pushbuttons. These only control the counter.

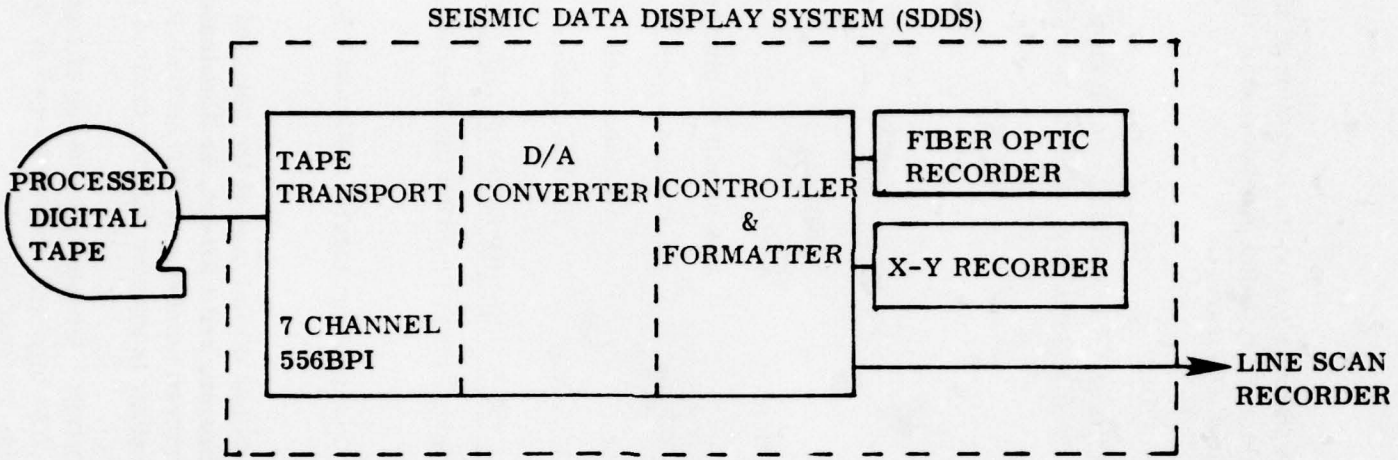


Figure 1. SDDS System Block Diagram.

SDDS FRONT PANEL

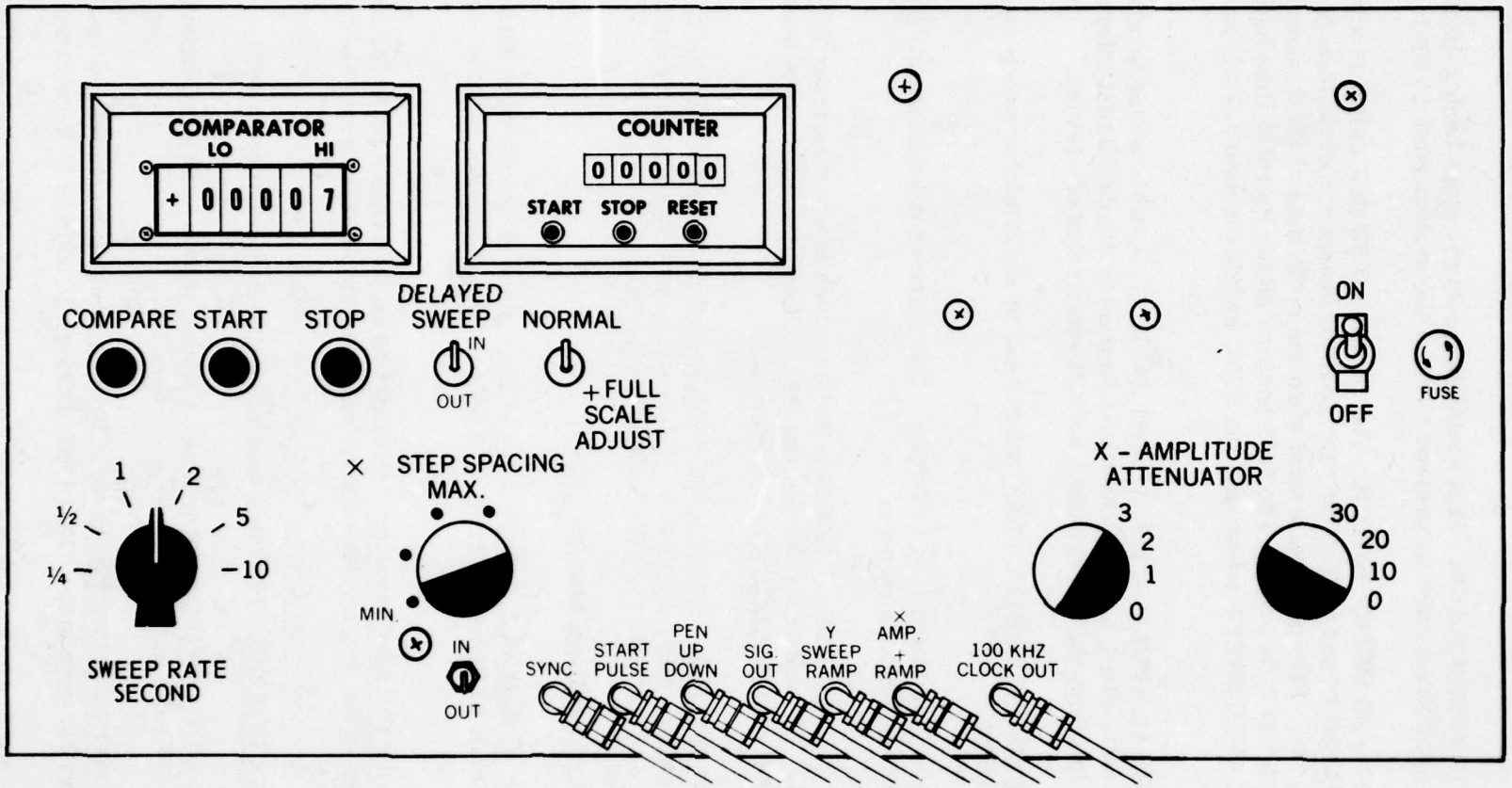


Figure 2. SDDS Front Panel.

1.4.5 START PUSHBUTTON. This switch initiates playback of the digital data.

1.4.6 STOP PUSHBUTTON. This switch immediately stops analog display process. The COMPARE pushbutton must be pressed to reset the system after STOP is pressed.

1.4.7 DELAYED SWEEP SWITCH. The DELAYED SWEEP switch is a two-position toggle switch labeled IN and OUT. The "IN" position causes the cycle time per record to increase by 300 ms. This position is used when the cycle time of the display is not zero as is the case for the X-Y recorder. The OUT position allows no extra time beyond the sweep time. The DELAYED SWEEP switch and the SYNC switch (Section 1.4.12) must be properly set.

1.4.8 NORMAL/+FULL SCALE ADJUST SWITCH. A two-position toggle switch labeled NORMAL and +FULL SCALE. NORMAL is used to display digital information. +FULL SCALE is used to adjust the analog output for full scale value of +10VDC.

1.4.9 SWEEP RATE SELECTOR. Selects one of six available sweep rates: 1/4, 1/2, 1, 2, 5, 10 seconds.

1.4.10 "X" STEP SPACING SELECTOR. This selector determines the spacing between records displayed on the X-Y recorder.

1.4.11 "X"-AMPLITUDE ATTENUATOR. Provides attenuation from 0 dB to 100 dB in steps of 1 dB. The attenuator determines the attenuation applied to the analog signal component displayed by the X-axis of the X-Y recorder.

1.4.12 SYNC SWITCH. A two-position toggle switch labeled IN and OUT. The IN position is used to synchronize SDDS start of data sweep with the display recorder. The OUT position is used if SYNC pulse is not provided for the SDDS (1.4.13.1).

1.4.13 INPUT-OUTPUT CONNECTORS

1.4.13.1 SYNC Connector. Accepts input trigger pulse to synchronize data display recorder with SDDS (if SYNC switch is IN). A pulse is not necessary if SYNC switch is OUT. (Pulse is 5 volts.)

1.4.13.2 START PULSE Connector. Provides an output trigger pulse for each record to initiate the sweep of the display device required when the SDDS controls sweep rate. (Pulse is 5 volts, 1 ms.)

1.4.13.3 PEN UP/DOWN. Provides control for the X-Y recorder's PEN.

1.4.13.4 SIG. OUT Connector. Provides an analog representation of digital data to the display device (±10 volts max.).

1.4.13.5 "Y" SWEEP RAMP Connector. Provides analog levels from 0 to +10 volts in 1,977 steps (5 mv for each step). Required to drive "Y" axis of X-Y recorder.

1.4.13.6 "X"-AMP. +RAMP Connector. Provides the X-Y recorder with the X-axis stepping value plus the analog signal variation.

1.4.13.7 100 KHz CLOCK OUT Connector. Provides 100 KHz clock pulses to display device for synchronous operation (5-volt square wave).

SECTION 2

OPERATION

2.1 DATA PLAYBACK

The SDDS was designed to play back information on the X-Y, Line Scan, and Fiber Optics recorders. The SDDS will display data at six different sweep rates with 1,977 discrete points per sweep. The START pushbutton starts the SDDS displaying data at the sweep rate indicated by the SWEEP RATE selector switch. The STOP pushbutton stops the process. The COMPARE pushbutton initiates tape search to the selected comparator thumbwheel value. Before attempting to operate the display instruments, the user should become familiar with the operation manual for that display device. The SDDS was designed for the following recorders.

1. X-Y Recorder, HP Model 7044a/7045a,
2. Universal Graphic Recorder (Line Scan Recorder),
3. Fiber Optics-Cathode Ray Tube Visicorder Oscillograph, Honeywell Model 1856A.

2.2 INITIAL POWERING

Before operating the SDDS, study the functional description of the front panel controls and connectors given in Section 1.4.

Turn system on. The counter will display all 8's. Depress the RESET button and then the START button on the counter. The counter's LEDs will display all zeros.

2.3 TAPE LOADING

Before loading the tape, study the functional description of the DIGI-DATA Tape System (Digital Tape Formatter, Dual Buffer and Digital Tape Transport).

1. Power up the DIGI-DATA Tape System.
2. Turn the tape formatter switch to READ.
3. Remove write ring located on the inner diameter of the tape reel.
4. Load tape on tape drive. Refer to drawing under the cover of the Digital Tape Transport for proper tape threading path.
5. Depress the tape drive's LOAD button. The tape will advance to LOAD point and halt.
6. Depress the tape drive's ON LINE button. The tape drive's ON LINE lamp will glow. Make sure the RING light is off.

2.4 OUTPUT SIGNAL LEVELS OF SDDS

The signal levels are given in Table 1.

2.5 CONTROL SETTINGS

2.5.1 X-Y RECORDER SETUP AND CALIBRATION

1. Make the connection shown in Figure 3.
2. Set the switches as shown in Table 2.
3. Depress the "X" pushbutton on the X-Y recorder and adjust the pen to the zero position on the chart.
4. Depress the "Y" pushbutton on the X-Y recorder and adjust the pen to the zero position on the chart.
5. Depress the START pushbutton.
6. Sweep Separation Adjustment. Turn "Y" range vernier, on the X-Y plotter, slowly clockwise until desired separation is sufficient. Try next lower range scale if separation is insufficient. If number of steps displayed is insufficient, increase "X Step" spacing, on the SDDS, until sufficient.
7. Sweep Length Adjustment. Turn "X" range vernier, on the X-Y plotter, slowly clockwise until sweep length is sufficient. Try next lower range if necessary.
8. Analog Signal Amplitude Adjustment. Decrease the attenuation on the SDDS "X Amplitude Attenuator" until analog signal variation is sufficiently large.
9. Insert new chart paper.
10. Set the COMPARATOR count to the record desired to start displaying analog data. Depress the COMPARE pushbutton.
11. When the count is reached, depress the START pushbutton.
12. Press the STOP pushbutton when the COUNTER is at the last record to be displayed.

2.5.2 UNIVERSAL GRAPHIC RECORDER SETUP AND CALIBRATION

1. Make the connection as shown in Figure 4.
2. There are two basic modes in which the recorder may be utilized:
   a. Start/Stop: Refer to Table 3 for initial switch setting.
   b. Synchronous: Refer to Table 4 for initial switch setting.
3. Depress the SDDS START pushbutton.
4. Increase the UGR's marking intensity verniers (scale and signal) until the record quality is satisfactory. Halt the SDDS by pressing the STOP pushbutton.
5. Upon completion of step 4, set the COMPARATOR to the desired record number. Depress the COMPARE pushbutton.

6. Depress and hold the paper advance pushbutton on the UGR for gap in display record. Release when desired gap is achieved.

7. Depress the START pushbutton.

8. The display recorder will begin displaying data from the specified record and continue until the end of a magnetic tape file is reached or until the STOP pushbutton is pressed.

9. If there is more than one data profiling line, followed by an EOF, on the tape, repeat the process starting at step 3.

2.5.3 FIBER OPTIC RECORDER SETUP AND CALIBRATION

The procedure given is to display a wiggle trace.

1. Make the connection as shown in Figure 5.

2. Set the switches as shown in Table 5.

   a. Depress the START Switch.

   b. Make adjustments to the fiber optic recorder as indicated in manuals. (This is a difficult setup requiring much time.)

   c. Press the paper advance. Set the COMPARATOR thumbwheel switches to the location of the data that is desired for display.

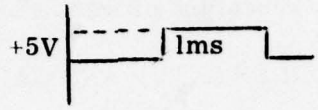
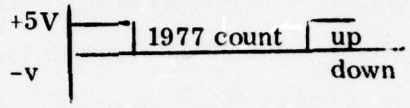
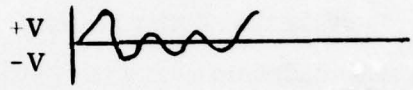
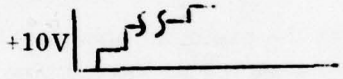
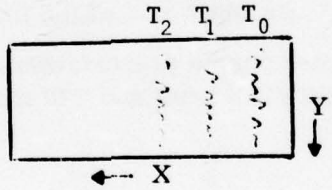
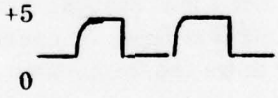
An intensity modulated line scan presentation can be obtained by inserting the Signal Out of SDDS into the "Z" axis input axis of the fiber optic recorder.

An intensity modulated wiggle presentation can be obtained by paralleling the Signal Out of SDDS into the VERTICAL input and "Z" axis input of the fiber optic recorder.

2.6 POWER DOWN

There is one step that must be done before powering down. The digital tape transport must be off line first. (Depress ON LINE switch; ensure that the ON LINE lamp is extinguished.) If tape transport is not off line first, it causes the tape transport to rewind in an illegal mode of operation. Power down the remainder of the equipment in any order.

TABLE 1. OUTPUT SIGNALS

BNC	Signal	Comment
Start pulse		
Pen up/down		
Output signal		Maximum of 10V PP
Y-sweep RAMP		1977 steps (5 MV per step)
X-Amplitude +Ramp 1977 count		At the end of each 1977 count, the pen will advance along the X axis. The processed analog signal will vary this DC level.
100 KHz Clock		

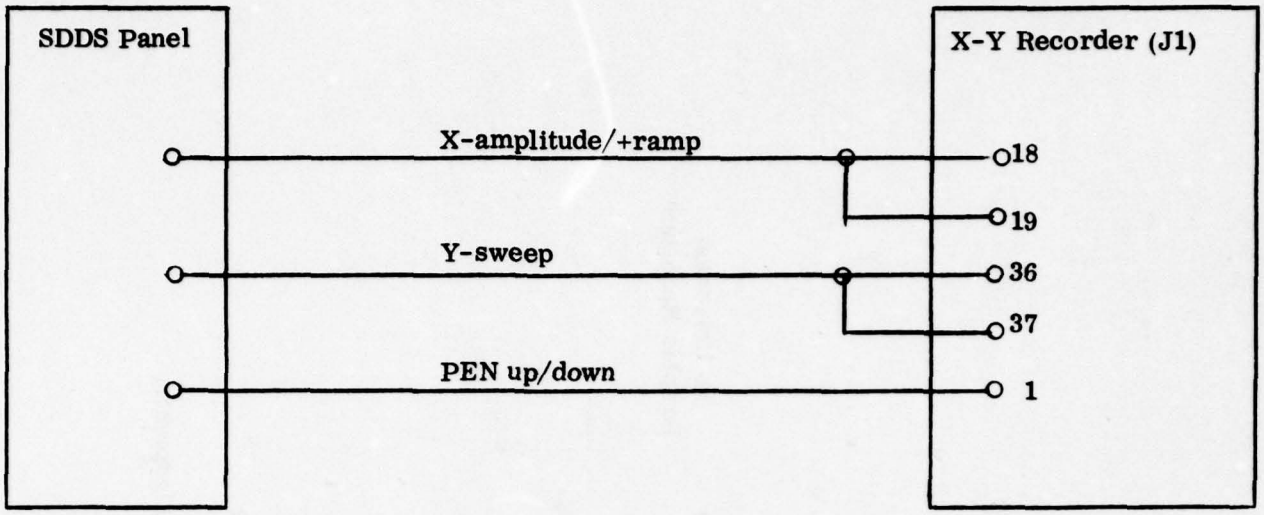


Figure 3. X-Y Recorder Connector Assignments.

TABLE 2. X-Y RECORDER AND SDDS PANEL INITIAL SWITCH SETTING

Equipment	Switch	Position
SDDS	Delayed Sweep	IN
SDDS	Sweep Rate	10 sec
SDDS	X STEP SPACING	MIN
SDDS	X-AMP. ATTENUATOR	30 dB
SDDS	SYNC	OUT
X-Y Recorder	LINE	ON
X-Y Recorder	CHART	Hold
X-Y Recorder	SERVO	ON
X-Y Recorder	PEN	Left
X-Y Recorder	X-RANGE	0.25
X-Y Recorder	X-RANGE VERNIER	C.C.W.
X-Y Recorder	Y-RANGE	0.5
X-Y Recorder	Y-RANGE VERNIER	C.C.W.
X-Y Recorder	X POLARITY	RT
X-7 Recorder	Y POLARITY	-UP

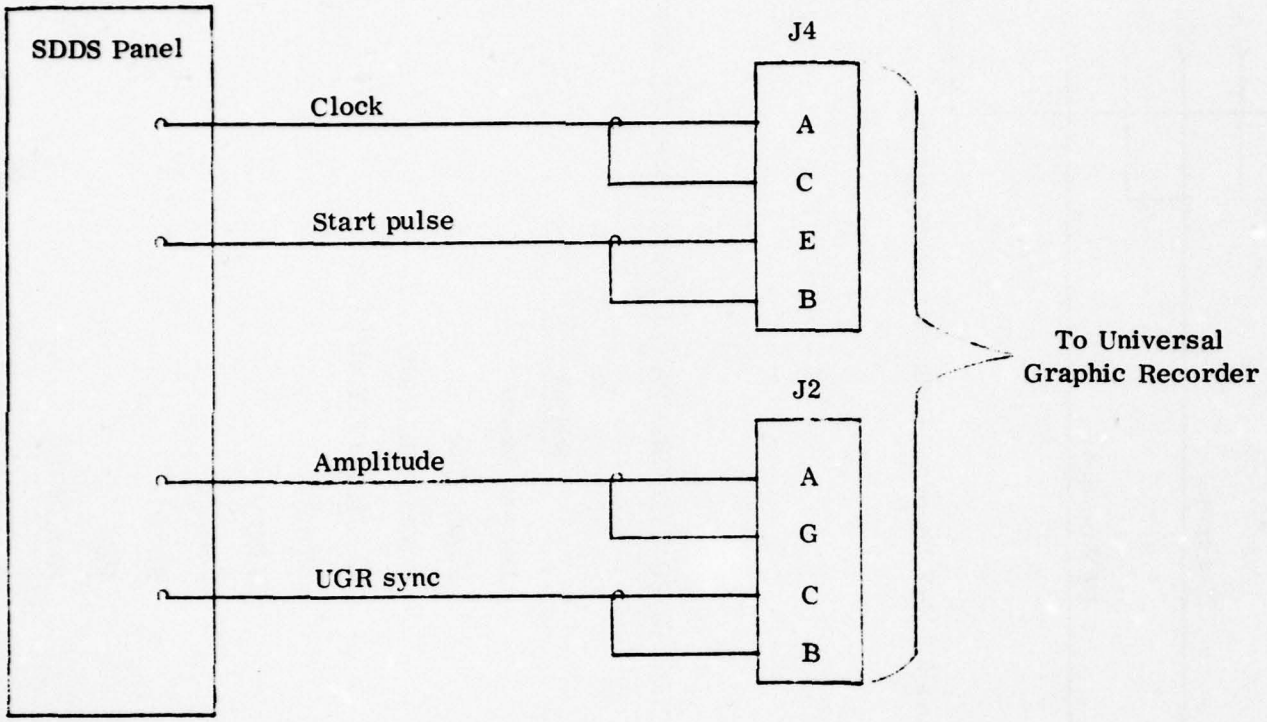


Figure 4. Universal Graphic Recorder Connector Assignments.

TABLE 3. UNIVERSAL GRAPHIC RECORDER AND SDDS PANEL SWITCH SETTING FOR START/STOP OPERATION

Equipment	Switch	Position
SDDS	SYNC	Out
SDDS	SWEEP RATE	1 sec
SDDS	DELAYED SWEEP	In
SDDS	NORMAL/+FULL SCALE	Normal
UGR	SEC/SCAN	1 sec
UGR	MARKER SELECT	10/S
UGR	LINES/IN	80 lines/inch
UGR	MODE SELECT	Start/Stop

TABLE 4. UNIVERSAL GRAPHIC RECORDER AND SDDS PANEL SWITCH SETTING FOR SYNCHRONOUS OPERATION

Equipment	Switch	Position
SDDS	SYNC	In
SDDS	SWEEP RATE	1 sec
SDDS	DELAYED SWEEP	Out
SDDS	NORMAL/+FULL SCALE	Normal
UGR	SEC/SCAN	1 sec
UGR	MARKER SELECT	10/S
UGR	LINES/IN	80 lines/inch
UGR	MODE SELECT	Continuous

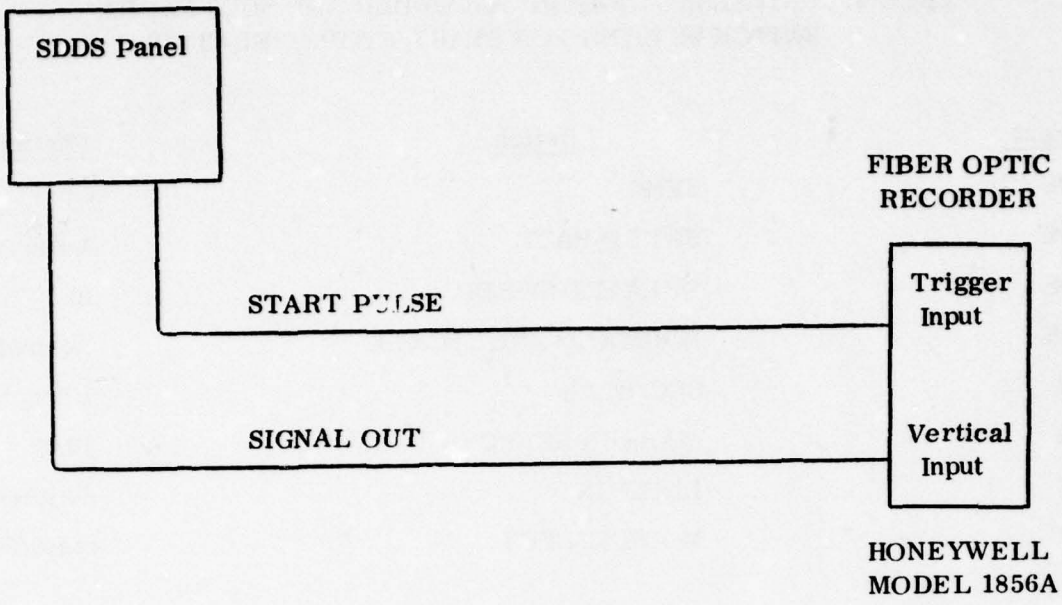


Figure 5. Fiber Optic Recorder Connector Assignments.

TABLE 5. FIBER OPTIC RECORDER AND SDDS PANEL INITIAL SWITCH SETTING.

Equipment	Switch	Position
SDDS	SYNC	Out
SDDS	SWEEP RATE	1/4 sec
SDDS	DELAYED SWEEP	Out
SDDS	NORMAL/+FULL SCALE	Normal
Fiber Optic	See Manual	

SECTION 3

CONCEPT AND THEORY OF OPERATION

3.1 CONCEPT OF OPERATION

The information coming from the Digital Tape Formatter is fed parallel into a 6-bit Digital-to-Analog (D/A) converter where 1,977 conversions take place per sweep. At the end of each sweep, the SDDS: (1) advances the counter by one; (2) switches to the opposite buffer in the Digital Tape Formatter. The output of the 6-bit D/A converter is available at two BNC connectors: (1) AMPLITUDE, this output has no conditioning; (2) "X" AMP./+RAMP, this output has an analog output riding on an increasing DC level (the DC level increases each sweep).

3.2 FUNCTION BLOCK DIAGRAM DESCRIPTION

The following paragraphs provide a functional description of the SDDS. (Refer to Figure 6.)

3.2.1 INPUT CONDITIONING (#1). The input conditioning circuits accept six parallel lines of data from the formatter upon command of the digital control circuits. The information is transferred to the 6-bit D/A circuit.

3.2.2 SIX-BIT D/A (#2). The 6-bit D/A circuit converts each group of 6 bits to an analog level and transfers it to the conditioned output circuit.

3.2.3 CONDITIONED OUTPUT (#3). The conditioned output circuits receive the analog level from the 6-bit D/A circuit and an increasing DC level from the variable X-sweep spacing circuits. There are two output forms: (1) buffered through an operation amplifier to the Signal OUT (BNC); (2) added to the variable X-sweep spacing circuit and buffered through an operational amplifier to the "X"-AMP./+RAMP (BNC).

3.2.4 DIGITAL CONTROL (#4). The digital control circuit accepts inputs from the clock circuit and the Formatter/Tape Drive. The Read A Character (RAC) and Go to Next Record (GNR) are controlled by the clock rate input.

3.2.5 1,977 COUNTER AND Y-SWEEP RAMP (#5). This circuit receives pulses from the Digital Control Circuit. When the count reaches 1,977, a pulse advances the Variable X-Sweep Ramp and pulses the Formatter's Go to Next Record (GNR) line.

3.2.6 CLOCK (#6). The clock section generates the timing signals that synchronize all internal operations of the SDDS. A crystal controlled oscillator generates a 100 KHz source frequency and a series of digital dividers through a SWEEP RATE selector switch, which provides the specific clock frequencies required.

3.2.7 READ OUT COUNTER (#7). The read out counter receives a pulse (REC READY) from the Formatter/Tape Drive unit when the next record has been loaded into the Formatter buffer. Each pulse is displayed as a numerical digit. The counter changes count one at a time in an appropriate direction (up or down).

3.2.8 VARIABLE X-SWEEP SPACING (#8). This unit increases its output DC level for each input pulse. This increasing DC level is applied to the conditioned output circuit.

3.2.9 POWER SUPPLIES. The SDDS has two low voltage power supplies. One provides a regulated 5-volt DC output and the other provides a regulated ±15-volt DC output.

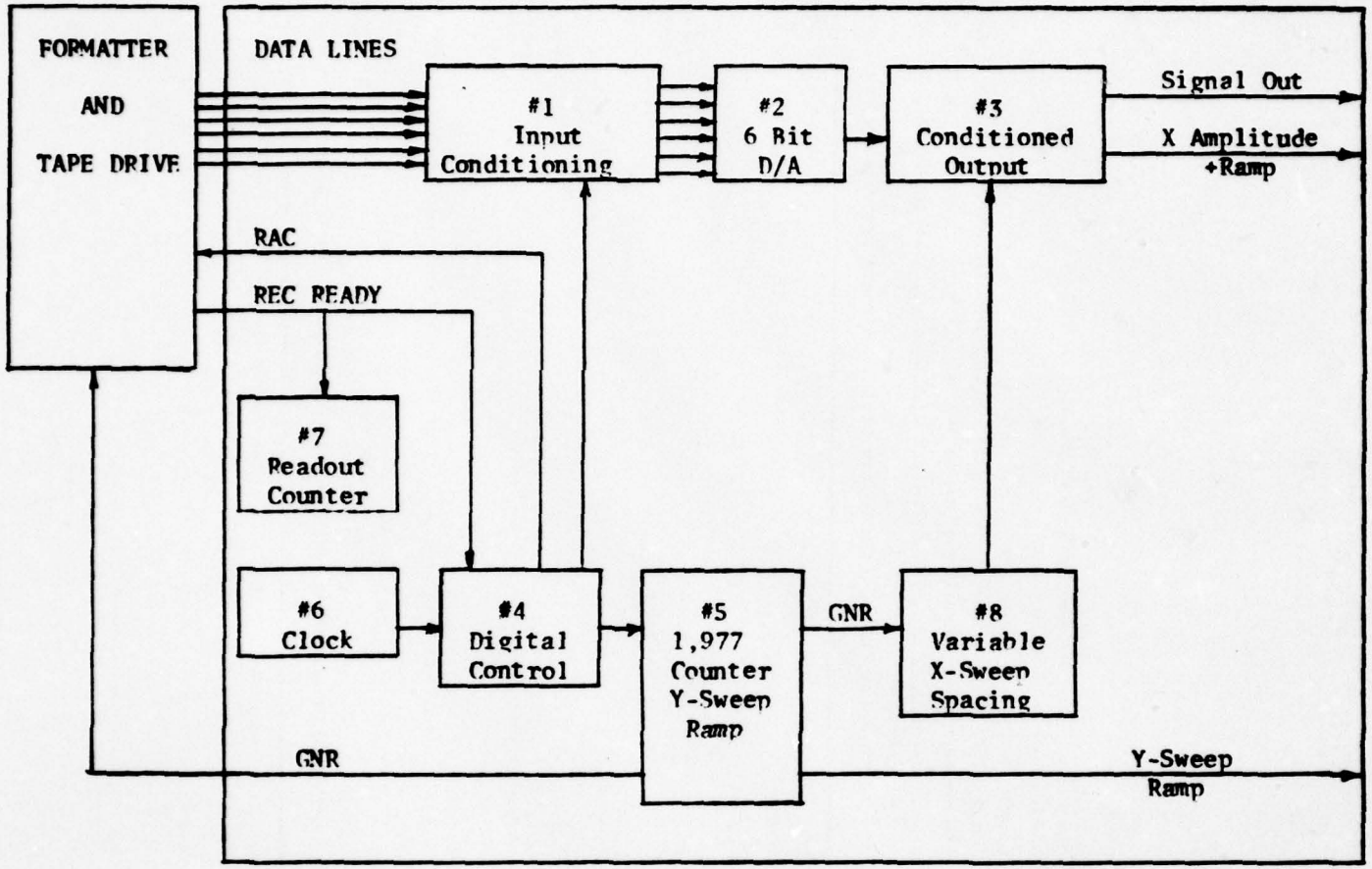
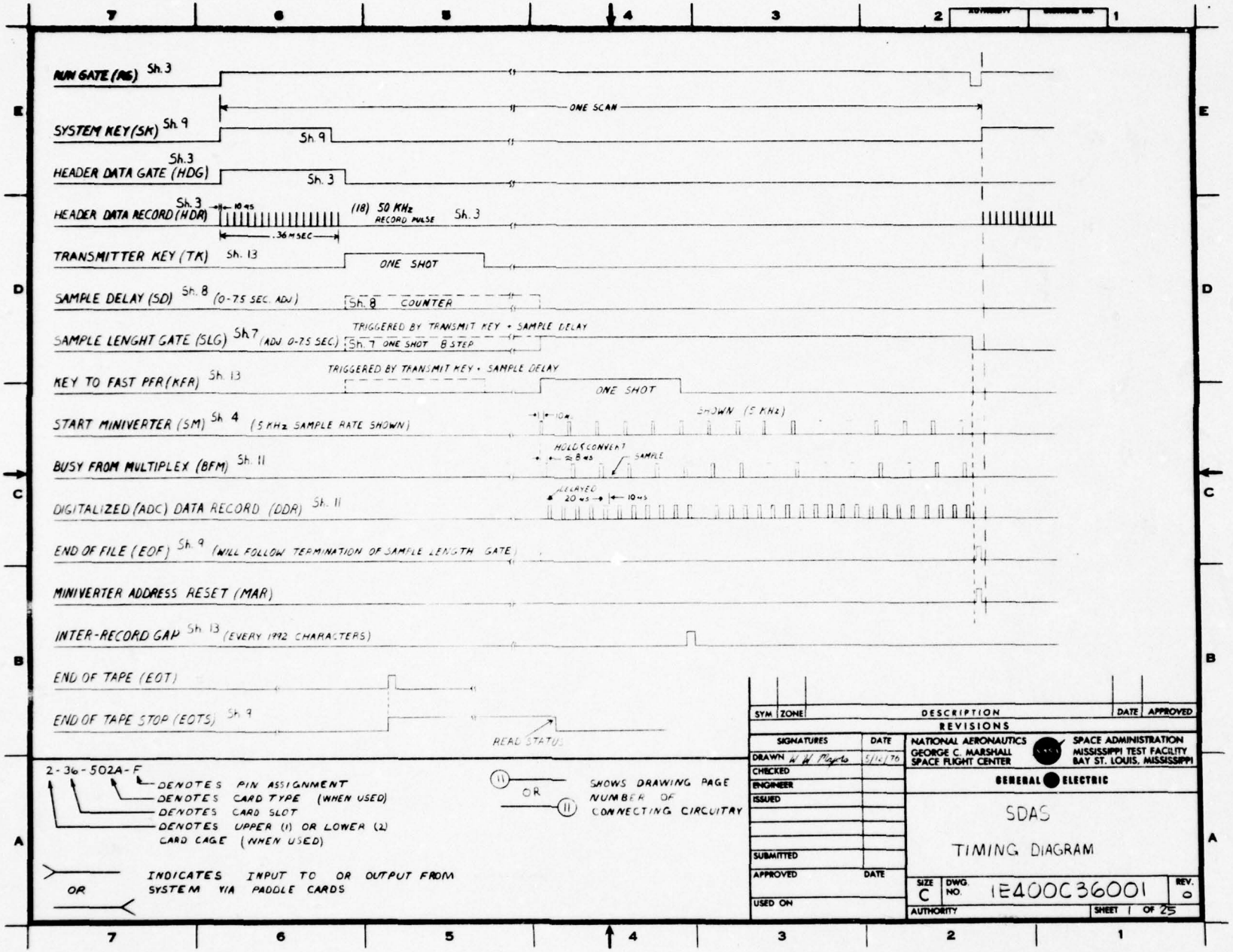


Figure 6. SDDS Function Block Diagram

APPENDIX A

SCHEMATICS

SEISMIC DATA ACQUISITION SYSTEM (SDAS)



QTY	FIG NO	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

	TIME						SWITCHES 1-18												** DDR 1 DDR 2							
1	PARITY																									
2	* EOF	DAY 8	2	HR 8	2	MIN 8	2	SW1 8	2	SW4 8	2	SW7 8	2	SW10 8	2	SW13 8	2	SW16 8	2	RECORD GAP	SIGN	32	SIGN	32		RECORD GAP	EOF
3		4	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1		1024	16	1024	16			
4		2	DAY 8	2	MIN 8	2	SEC 8	2	SW3 8	2	SW6 8	2	SW9 8	2	SW12 8	2	SW15 8	2	SW18 8		512	8	512	8			
5		1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	4		256	4	256	4			
6		DAY 8	2	HR 8	2	SEC 8	2	SW2 8	2	SW5 8	2	SW8 8	2	SW11 8	2	SW14 8	2	SW17 8	2		128	2	128	2			
7		4	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1	4	1		64	1	64	1			

HEADER INFORMATION

There is always an integer number of 36 bit computer words between record gaps, but there will never be more than 332 36 bit words between record gaps.

* EOF = End of file
** DDR = Digital Data Record

41

SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

SIGNATURES	DATE
DRAWN A. W. Myers	5/1/70
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS SPACE ADMINISTRATION
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MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI

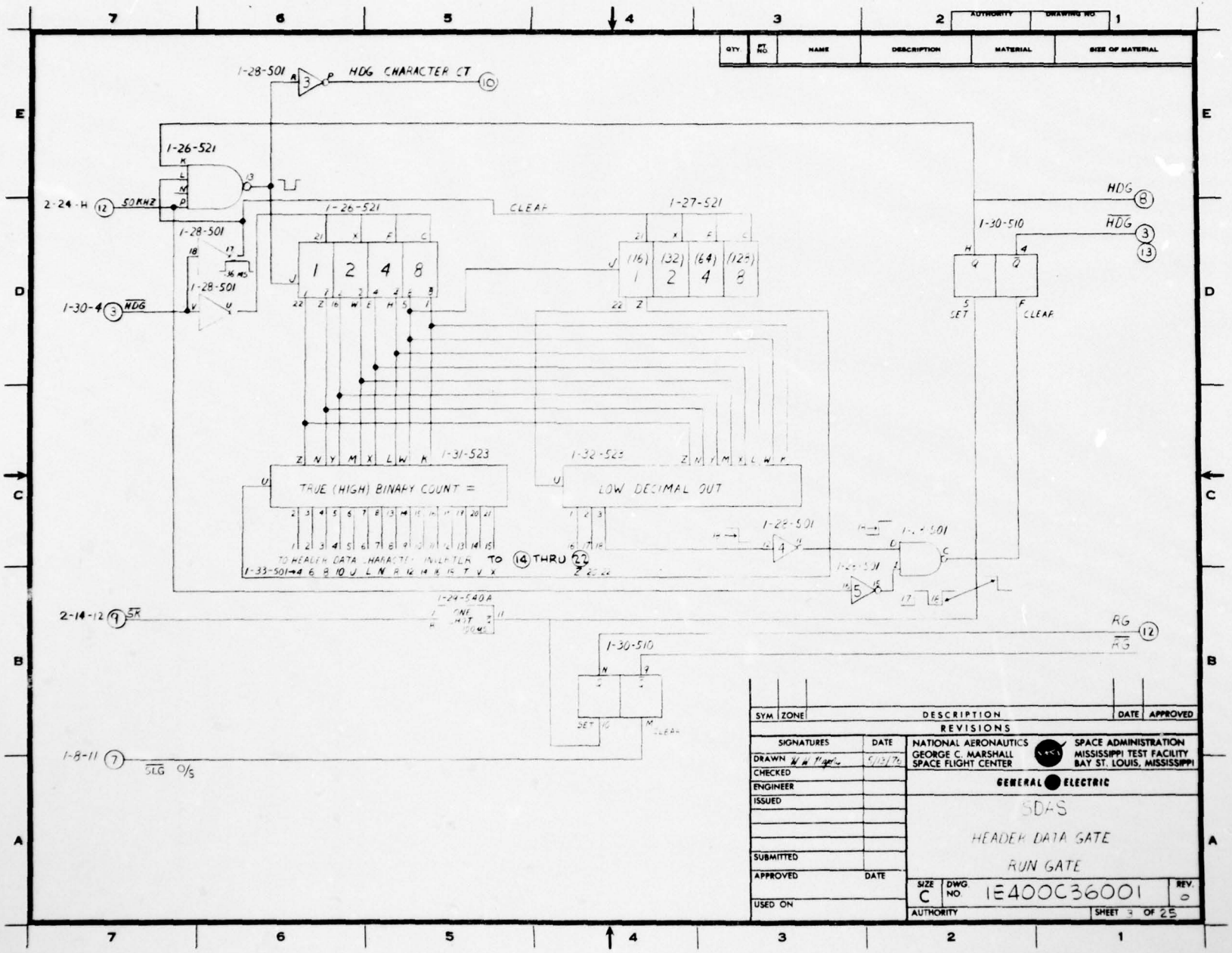
GENERAL ELECTRIC

SDAS

DIGITAL TAPE FORMAT
556 bpi Odd Parity

SIZE	DWG. NO	REV.
C	1E400C36001	G

AUTHORITY | SHEET 2 OF 25



QTY	PT NO.	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

AUTHORITY | DRAWING NO.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN W. W. Wyatt	5/13/70
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

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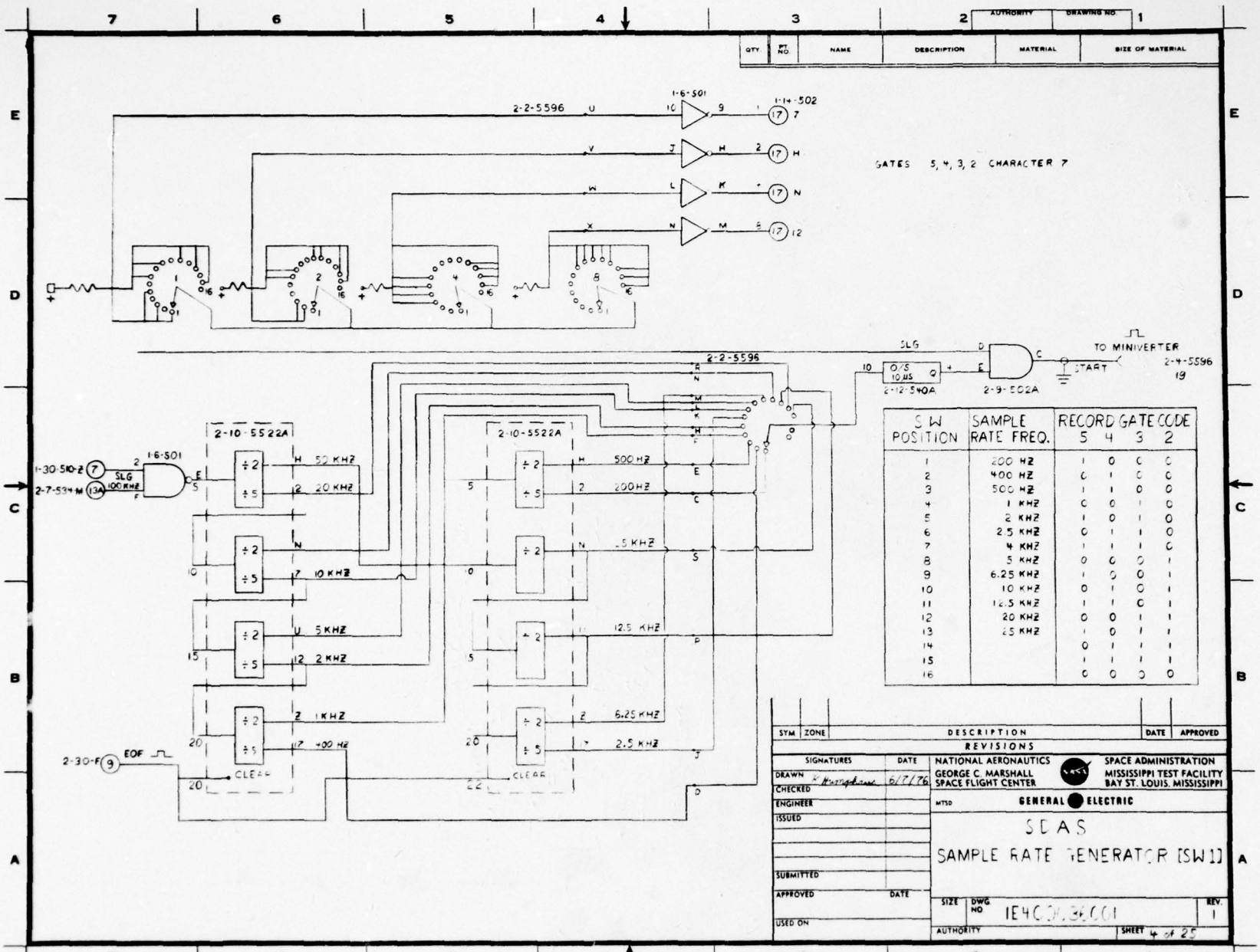
SDAS

HEADER DATA GATE

RUN GATE

SIZE	DWG NO.	REV.
C	1E400C36001	0

AUTHORITY | SHEET 3 OF 25



SW POSITION	SAMPLE RATE FREQ.	RECORD GATE CODE 5	4	3	2
1	200 HZ	1	0	0	0
2	400 HZ	0	1	0	0
3	500 HZ	1	1	0	0
4	1 KHZ	0	0	1	0
5	2 KHZ	1	0	1	0
6	2.5 KHZ	0	1	1	0
7	4 KHZ	1	1	1	0
8	5 KHZ	0	0	0	1
9	6.25 KHZ	1	0	0	1
10	10 KHZ	0	1	0	1
11	12.5 KHZ	1	1	0	1
12	20 KHZ	0	0	1	1
13	25 KHZ	1	0	1	1
14		0	1	1	1
15		1	1	1	1
16		0	0	0	0

QTY.	PT. NO.	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN	6/7/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

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BAY ST. LOUIS, MISSISSIPPI

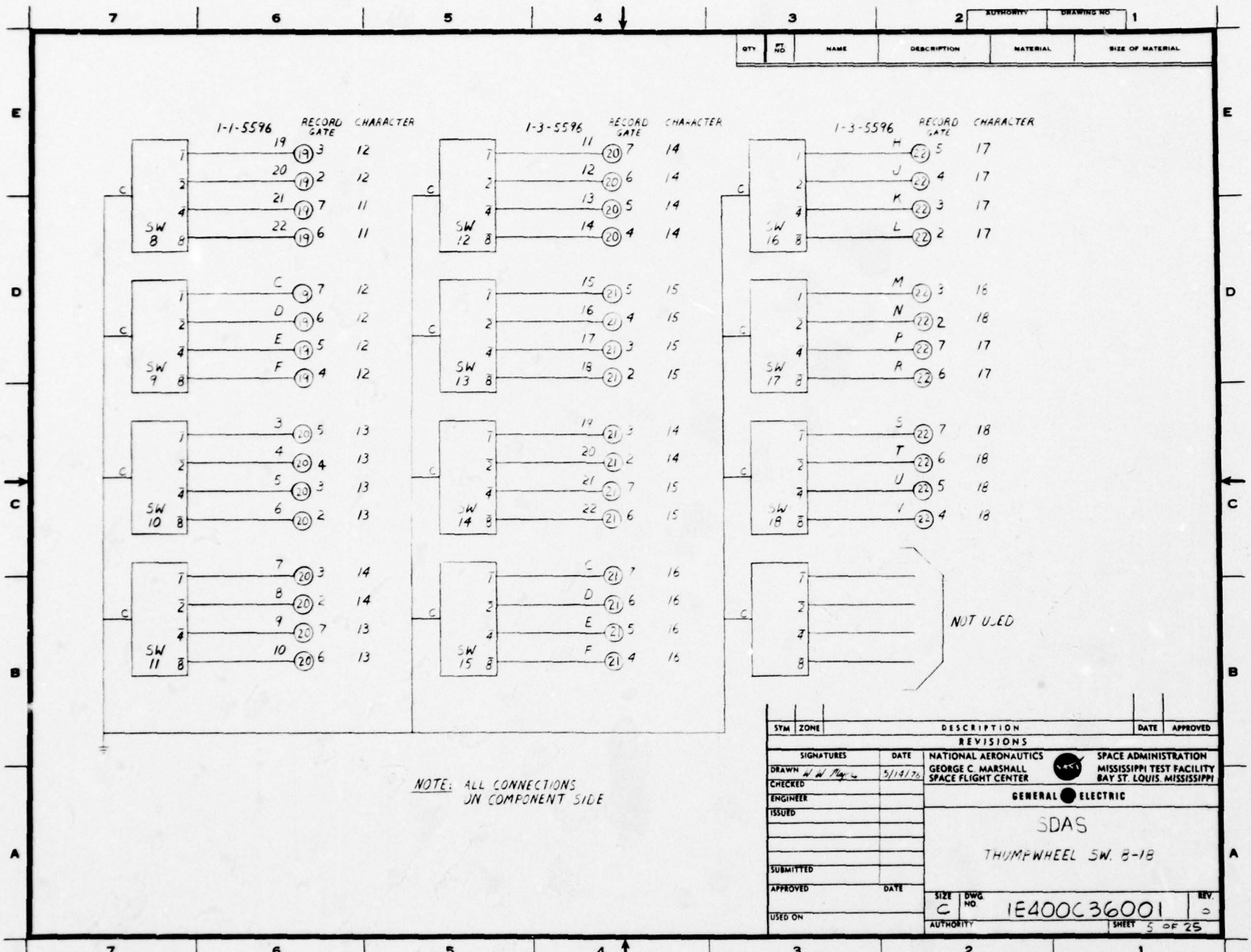
MTSD GENERAL ELECTRIC

SEAS

SAMPLE RATE GENERATOR [SW1]

SIZE | DWG NO 1E4C[illegible]3[illegible]001 | REV. 1

AUTHORITY | SHEET 4 of 25


AUTHORITY
DRAWING NO
QTY
PT NO
NAME
DESCRIPTION
MATERIAL
SIZE OF MATERIAL
1-1-5596
RECORD GATE
CHARACTER
SW 8
SW 9
SW 10
SW 11
1-3-5596
SW 12
SW 13
SW 14
SW 15
1-3-5596
SW 16
SW 17
SW 18
NOT USED
NOTE: ALL CONNECTIONS ON COMPONENT SIDE
SYM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
DRAWN
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
USED ON
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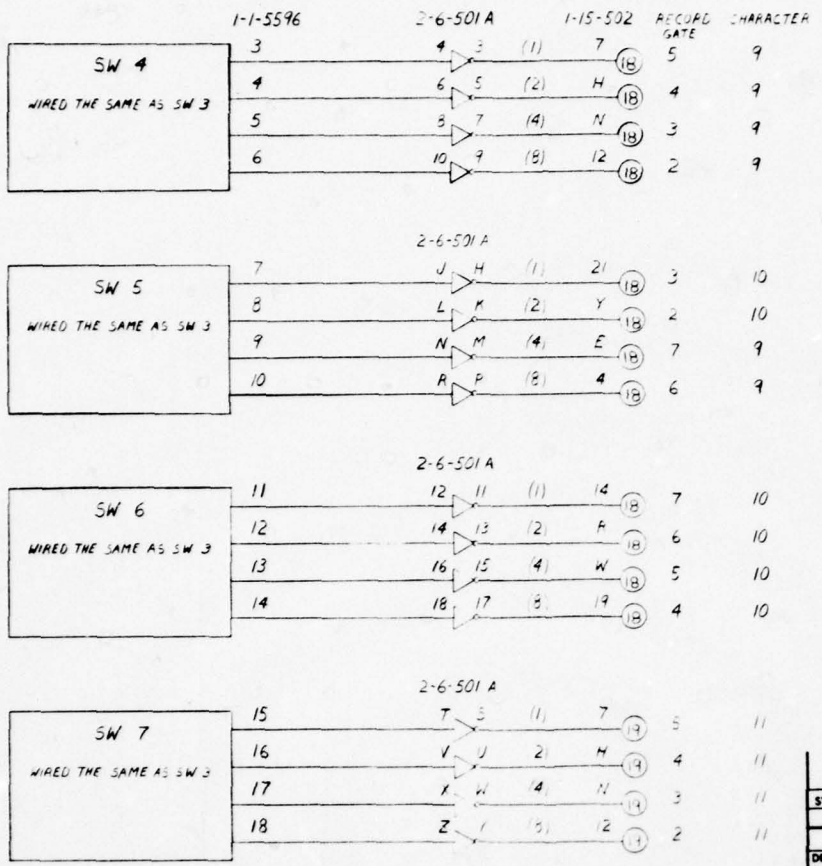
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
THUMPWHEEL SW. 8-18
SIZE C
DWG NO 1E400C36001
REV D
AUTHORITY
SHEET 5 OF 25

QTY	ITEM NO	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL



SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN W. H. Magee	5/14/70
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

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MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI

GENERAL ELECTRIC

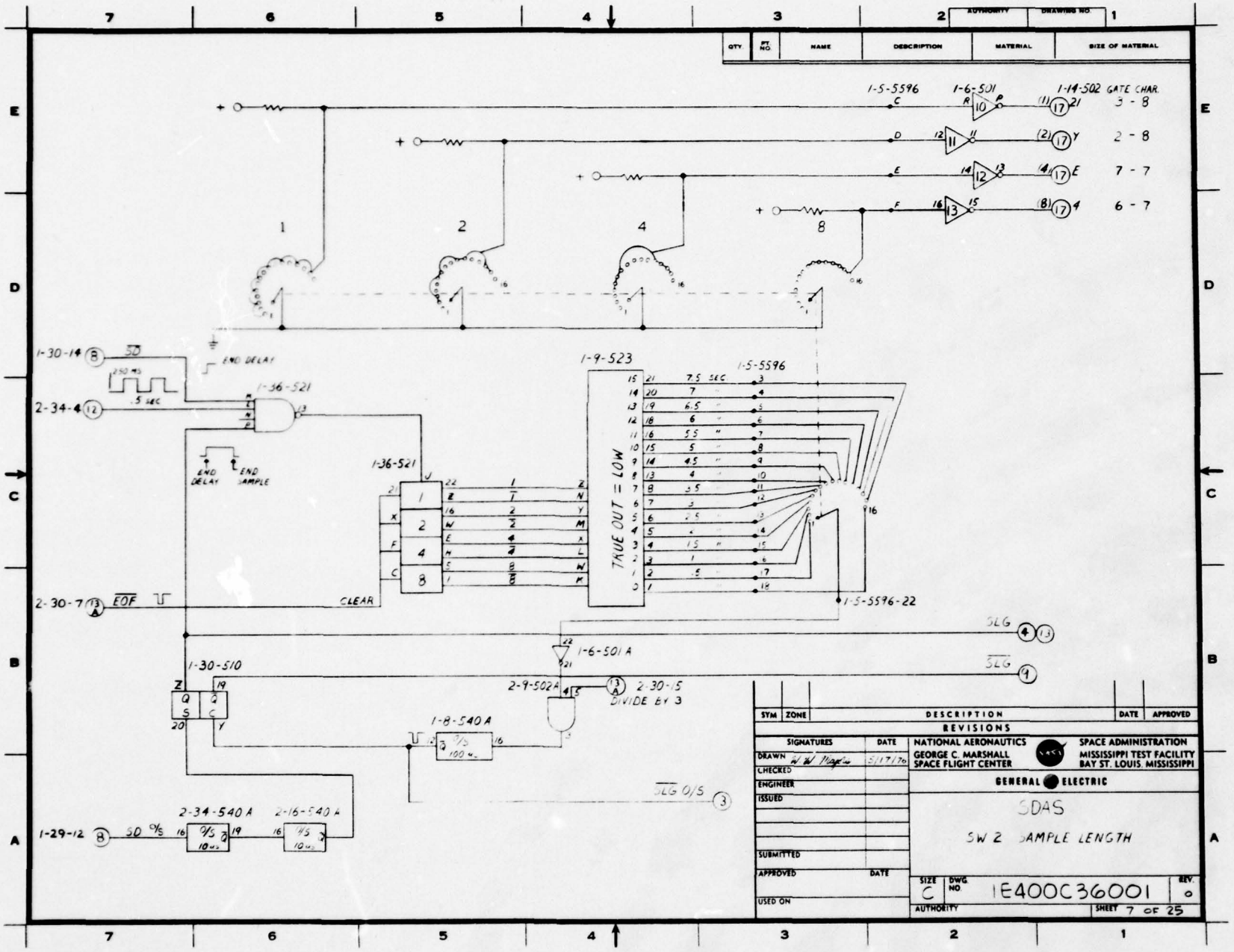
SDAS

DATA SWITCHES 4-7

SIZE	DWG. NO.	REV.
C	1E400C36001	0

AUTHORITY

SHEET 6 OF 25



QTY	PT NO.	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

AUTHORITY | DRAWING NO.

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN W. W. Hagler	5/17/70
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

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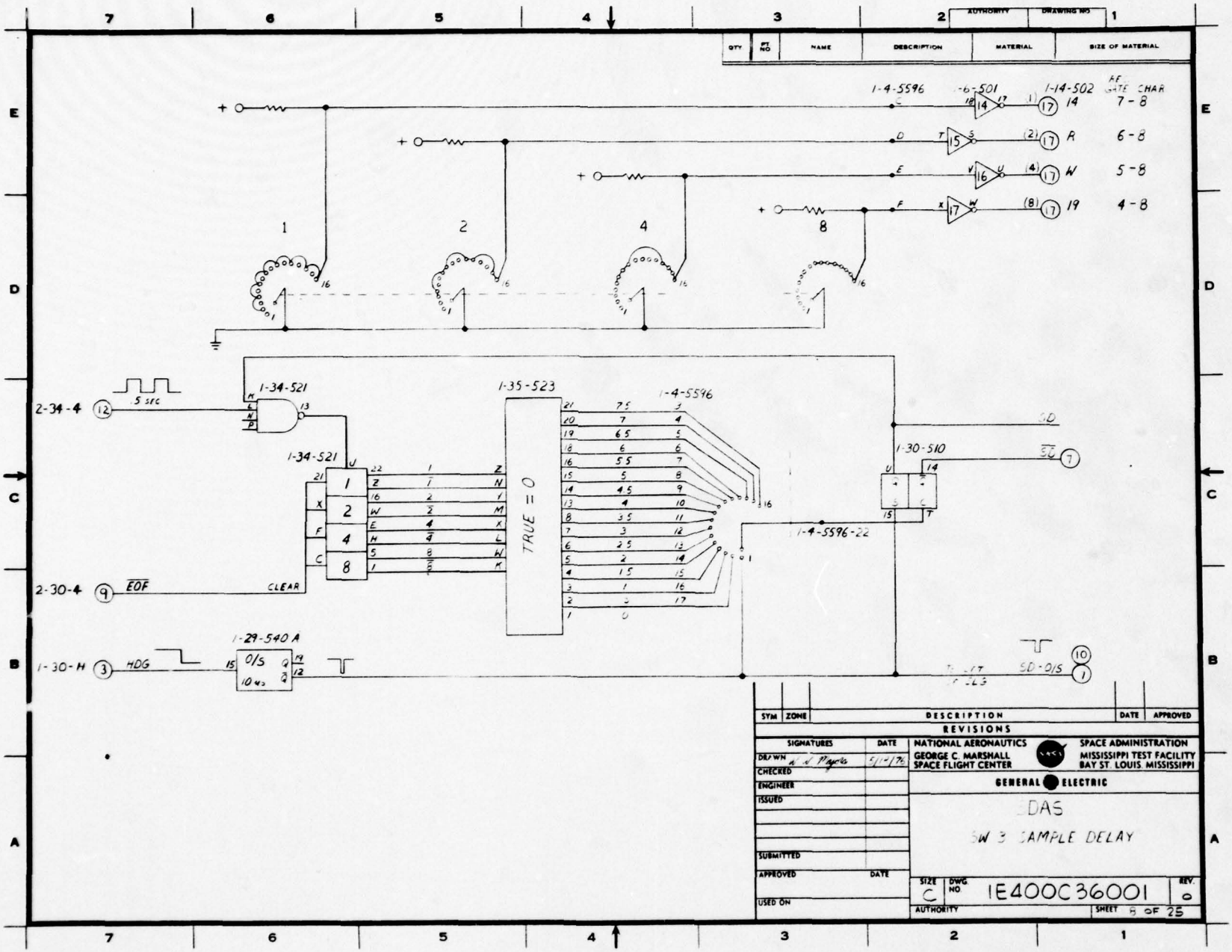
GENERAL ELECTRIC

SDAS

SW 2 SAMPLE LENGTH

SIZE C | DWG NO. 1E400C36001 | REV. 0

AUTHORITY | SHEET 7 OF 25


1-4-5596
1-6-501
1-14-502
14 7-8
R 6-8
W 5-8
19 4-8
1
2
4
8
1-34-521
1-35-523
1-4-5596
TRUE = 0
1-30-510
1-4-5596-22
2-34-4
.5 SEC
2-30-4
EOF
CLEAR
1-30-H
HDG
1-29-540 A
SD
SD-O/S
DAS
SW 3 SAMPLE DELAY
1E400C36001
REV. O
SHEET 8 OF 25
NATIONAL AERONAUTICS SPACE ADMINISTRATION
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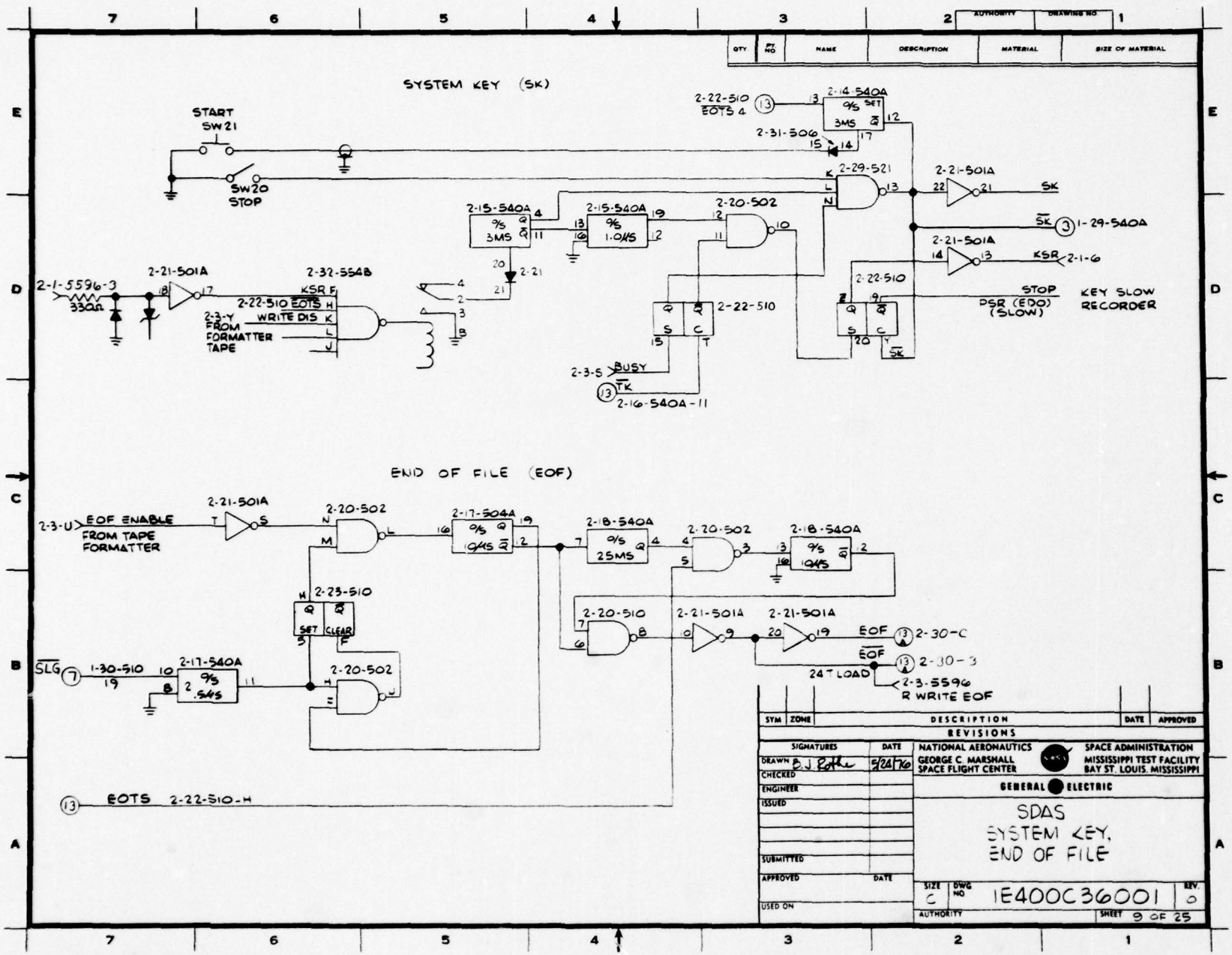
GENERAL ELECTRIC
REVISIONS
SIGNATURES
DRAWN
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
USED ON



QTY	PT NO	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN B J Pyle	5/24/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

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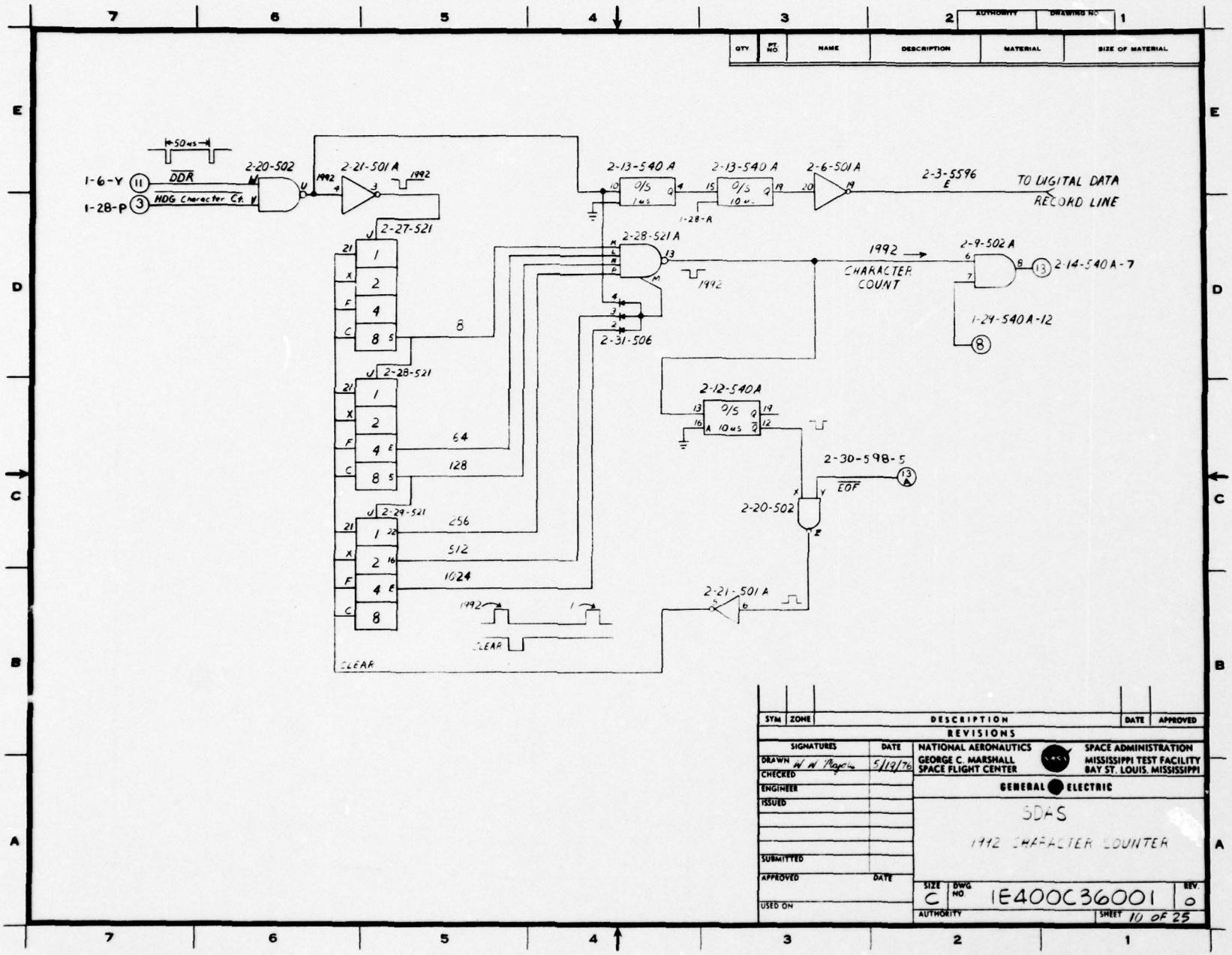
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC

SDAS
SYSTEM KEY,
END OF FILE

SIZE	DWG NO	REV.
C	1E400C36001	0

AUTHORITY SHEET 9 OF 25



QTY	PT. NO	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

AUTHORITY | DRAWING NO

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN W N Maples	5/19/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

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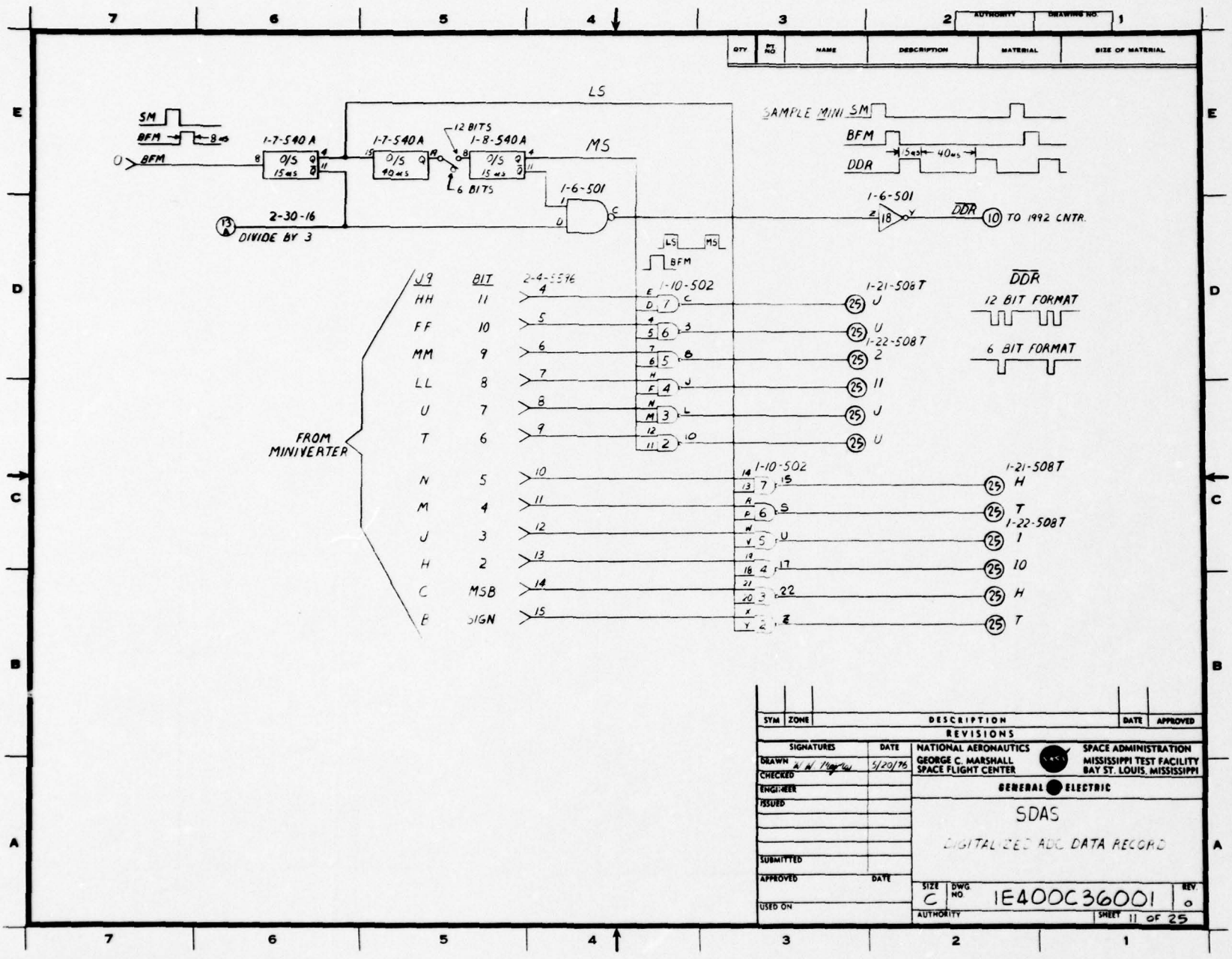
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC

SDAS
1112 CHARACTER COUNTER

SIZE C | DWG NO 1E400C36001 | REV 0
AUTHORITY | SHEET 10 OF 25



QTY	PT NO.	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

AUTHORITY | DRAWING NO

SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN N. W. Hagen	5/20/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI

GENERAL ELECTRIC

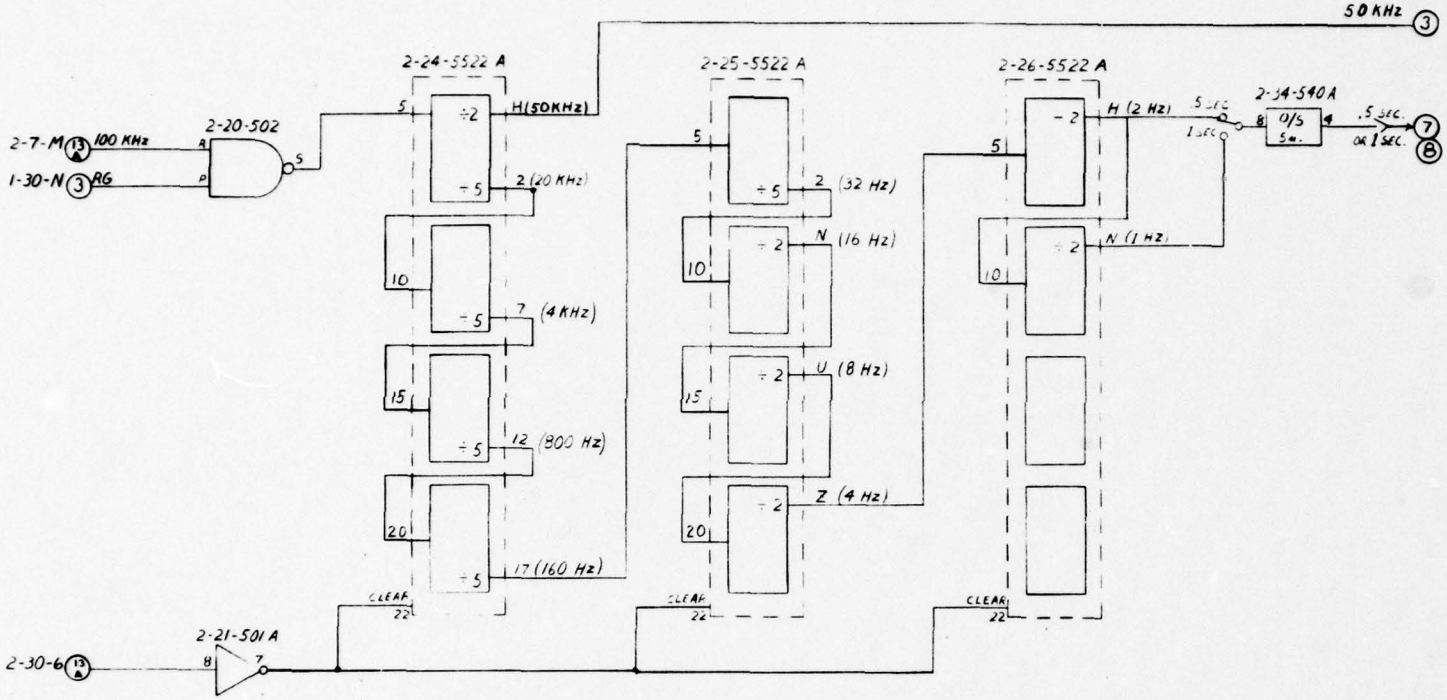
SDAS

DIGITALIZED ADC DATA RECORD

SIZE	DWG NO.	REV.
C	1E400C36001	0

AUTHORITY | SHEET 11 OF 25

QTY	ITEM NO	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL



SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

SIGNATURES	DATE
DRAWN W. W. Pogue	5/20/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC

SDAS

50KHz GENERATOR

SIZE	DWG NO	REV
C	1E400C36001	0

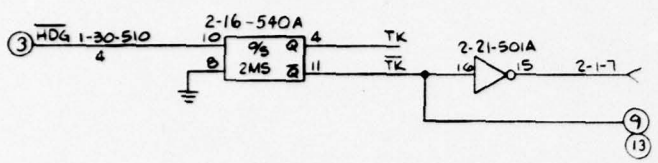
AUTHORITY

SHEET 12 OF 25

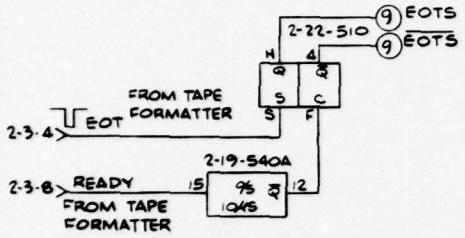
QTY	PART NO.	NAME	DESCRIPTION	MATERIAL	SIZE OF MATERIAL

AUTHORITY | DRAWING NO

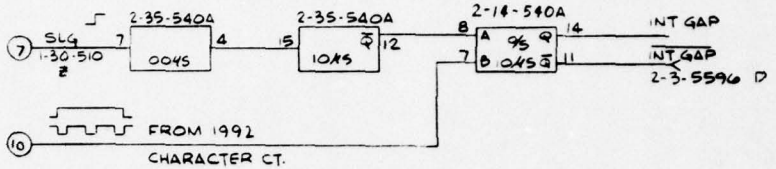
TRANSMITTER KEY (TK)



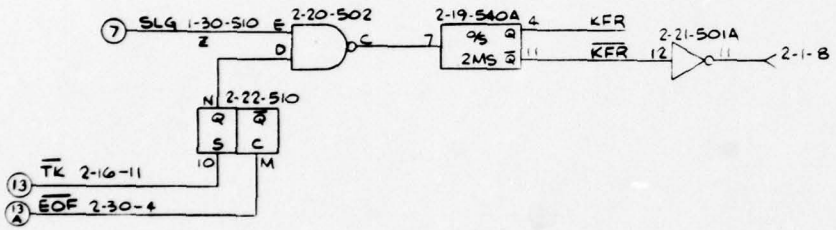
END OF TAPE STOP (EOTS)



INTER-RECORD GAP



KEY TO FAST RECORDER (KFR) (P.S.R. RECORDER)



SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
DRAWN B. J. Rother	5/24/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI

GENERAL ELECTRIC

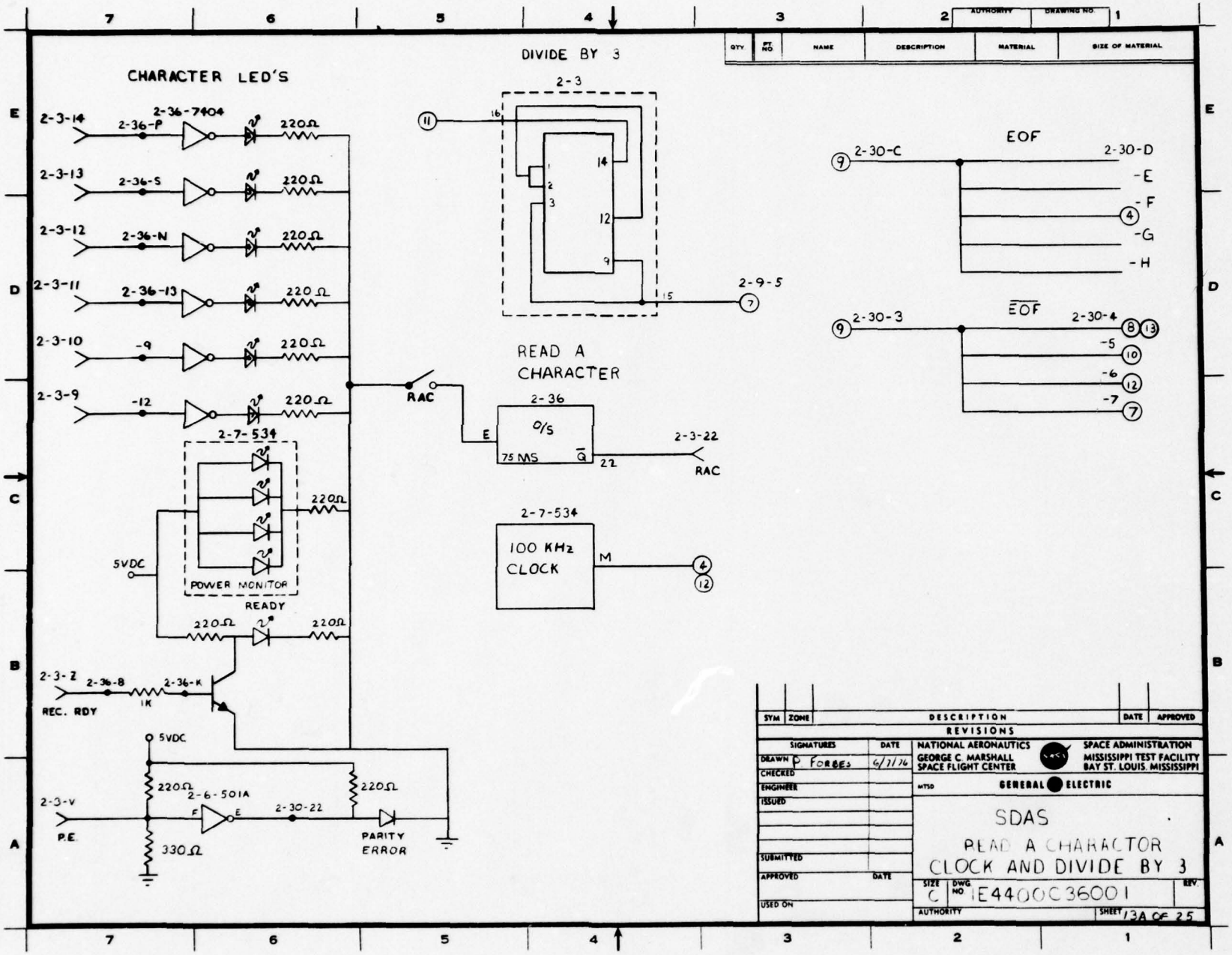
SDAS
TRANSMITTER KEY & RECORDER CONTROL

SIZE C | DWG NO 1E400C36001 | REV 0

AUTHORITY

SHEET 13 OF 25

63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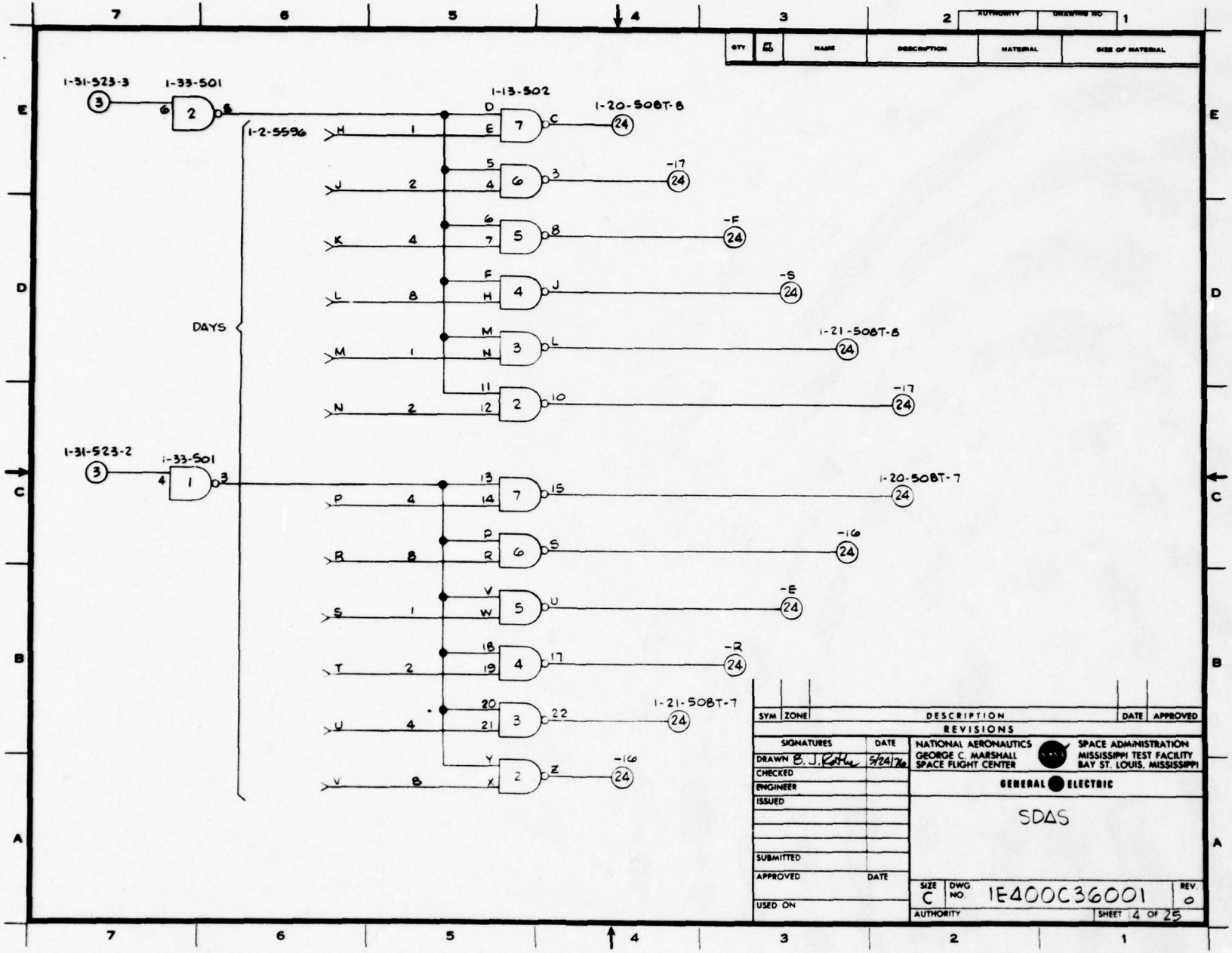
2-36-P
2-36-7404
220Ω
2-3-13
2-36-S
2-3-12
2-36-N
2-3-11
2-36-13
220 Ω
2-3-10
-9
2-3-9
-12
2-7-534
POWER MONITOR
READY
5VDC
2-3-Z
2-36-8
1K
2-36-K
REC. RDY
2-3-V
P.E.
2-6-501A
330Ω
2-30-22
PARITY
ERROR
DIVIDE BY 3
2-3
14
12
9
15
2-9-5
READ A
CHARACTER
RAC
2-36
O/S
75 MS
2-3-22
100 KHz
CLOCK
EOF
2-30-C
2-30-D
-E
-F
-G
-H
2-30-3
2-30-4
-5
-6
-7
DESCRIPTION
REVISIONS
NATIONAL AERONAUTICS
SPACE ADMINISTRATION
GEORGE C. MARSHALL
SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
READ A CHARACTOR
CLOCK AND DIVIDE BY 3
1E440OC36001
SHEET 13A OF 25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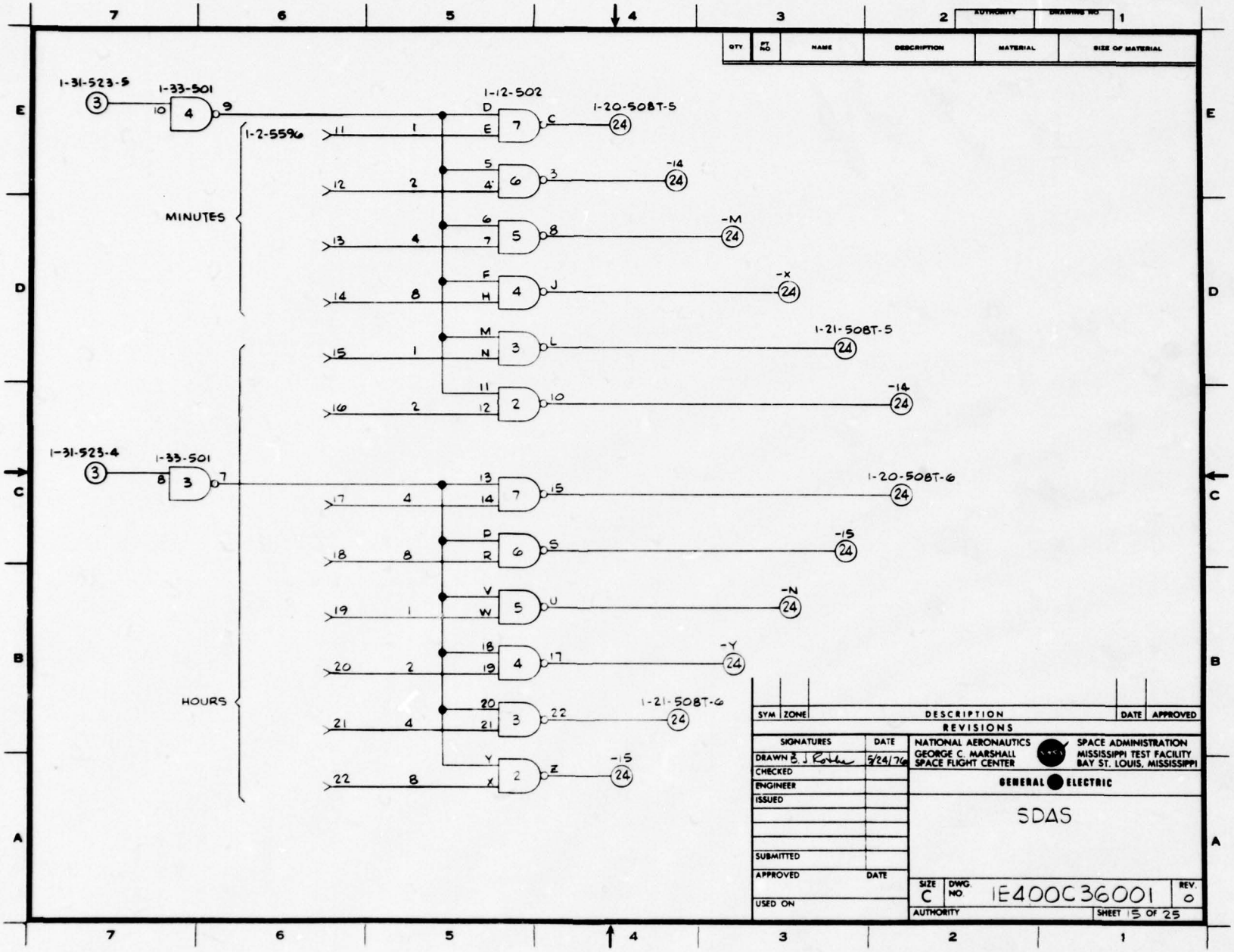
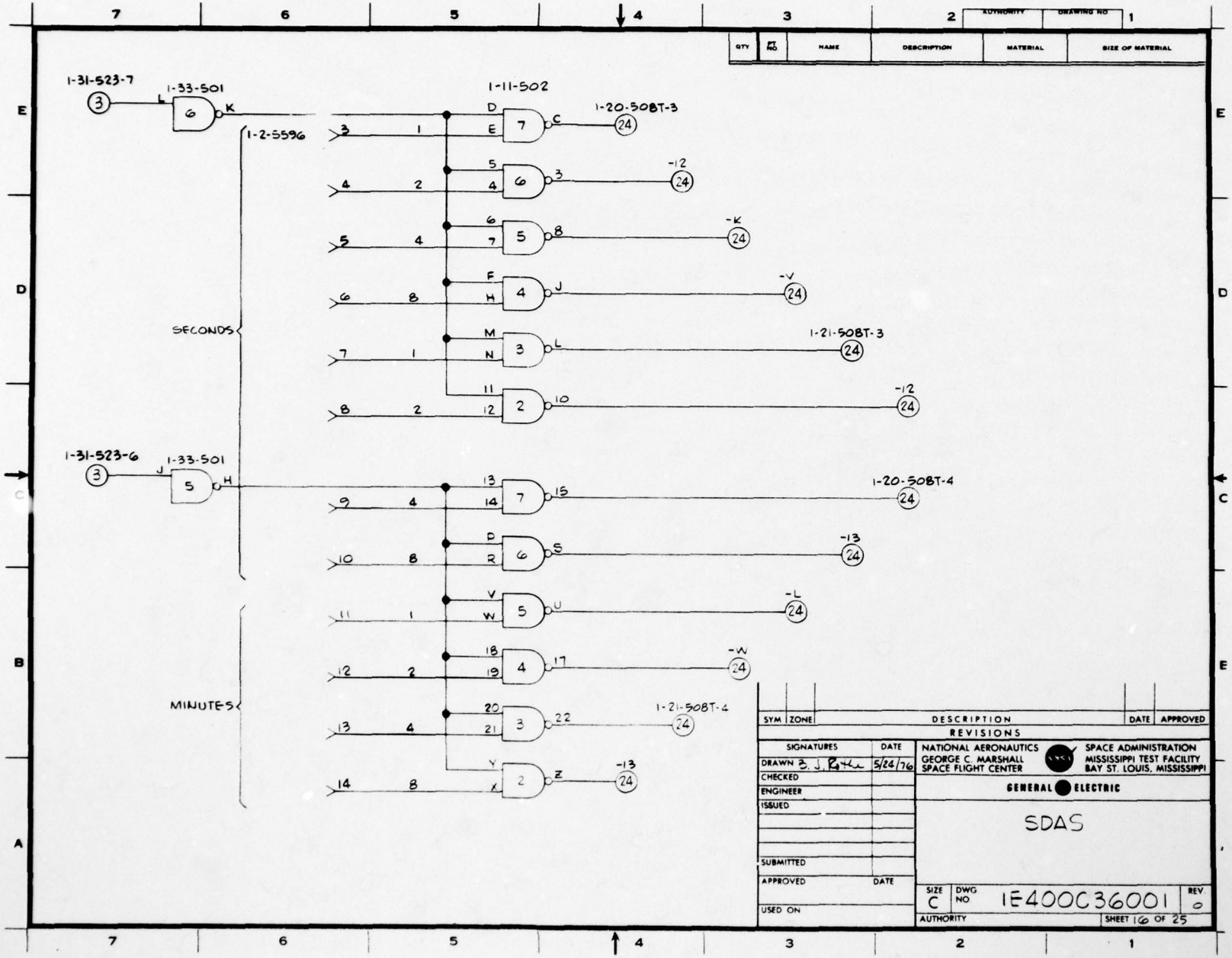
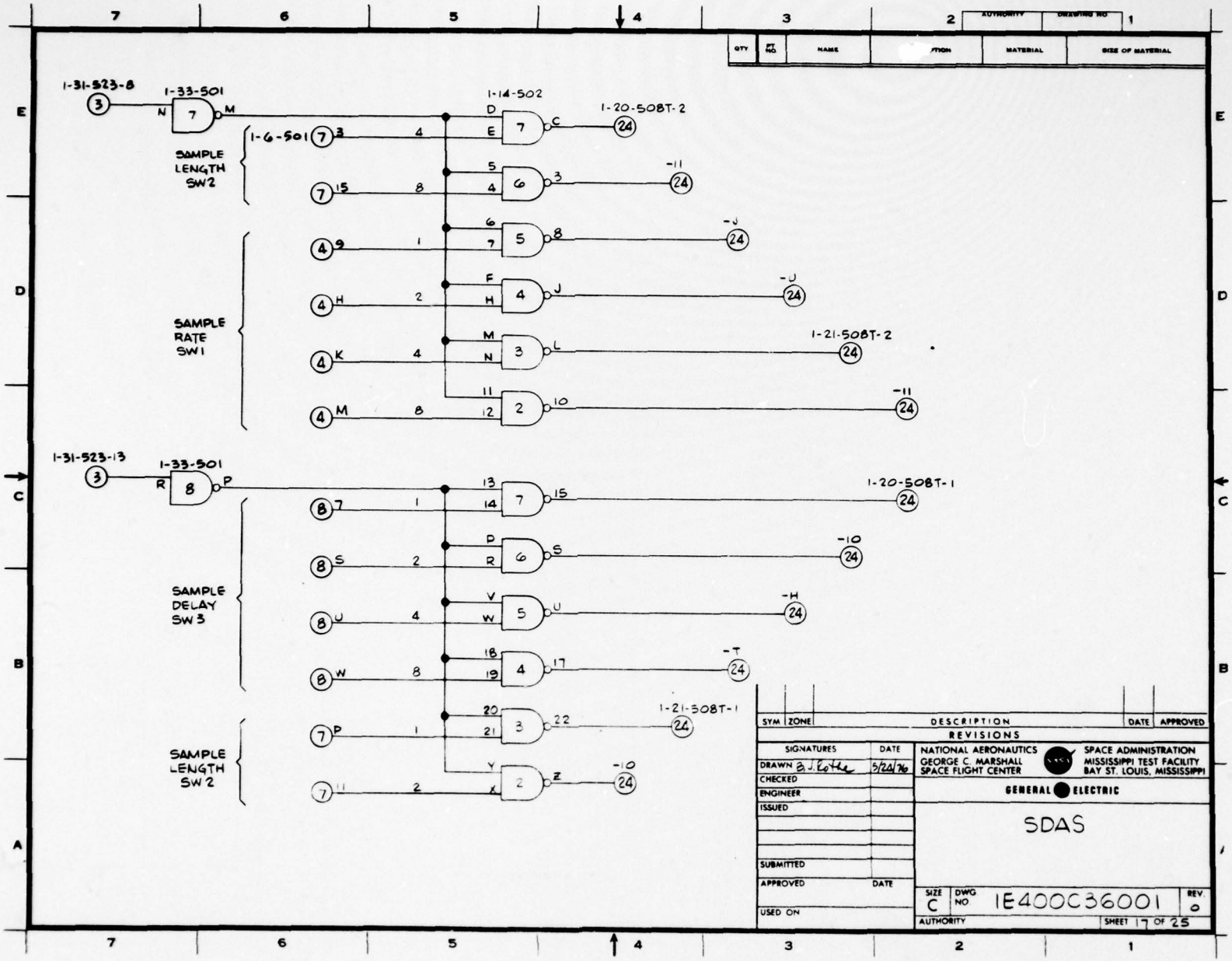
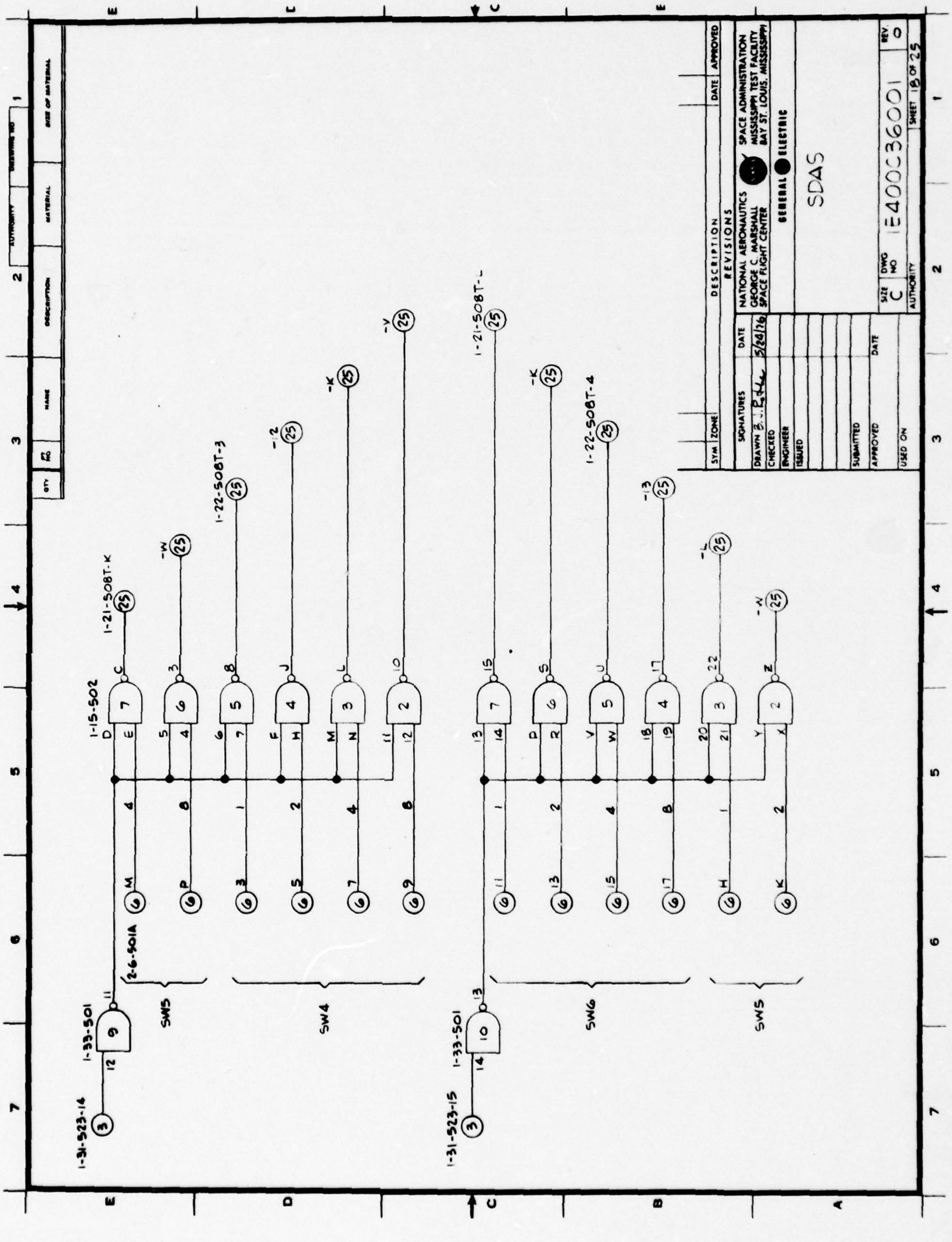
1-33-501
1-13-502
1-20-508T-8
1-2-5596
DAYS
1-21-508T-8
1-31-523-2
1-33-501
1-20-508T-7
1-21-508T-7
-17
-F
-S
-16
-E
-R
-16
-17
SDAS
1E400C36001
SHEET 4 OF 25

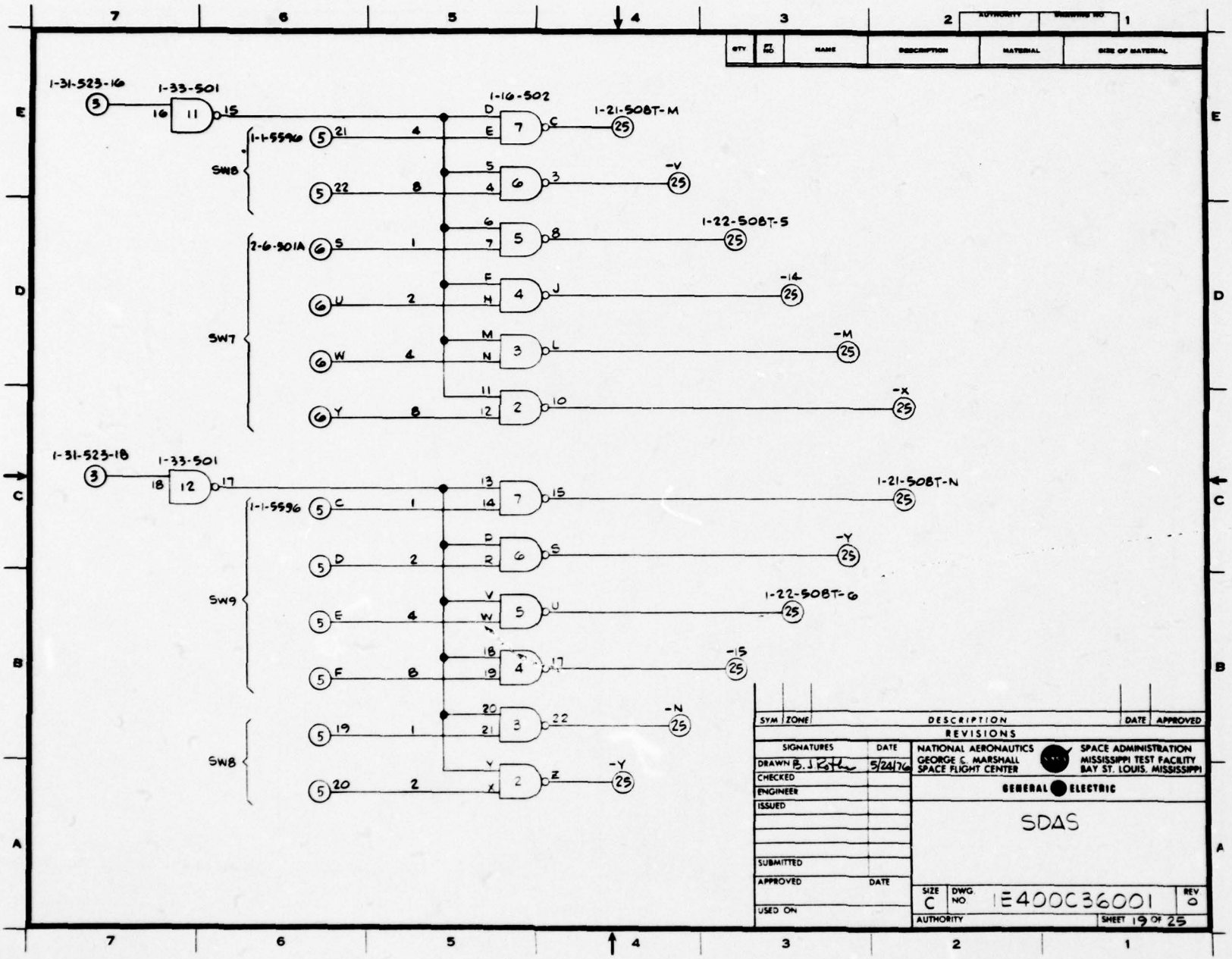

1-31-523-5
1-33-501
1-12-502
1-20-508T-5
1-2-5596
MINUTES
-14
-M
-X
1-21-508T-5
-14
1-31-523-4
1-33-501
1-20-508T-6
-15
-N
-Y
HOURS
1-21-508T-6
-15
DRAWN B. J. Robbins 5/24/76
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
USED ON
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG. NO. 1E400C36001
REV. 0
SHEET 15 OF 25


1-31-523-7
1-33-501
1-11-502
1-20-50BT-3
1-2-5596
SECONDS
1-21-50BT-3
1-31-523-6
1-33-501
1-20-50BT-4
MINUTES
1-21-50BT-4
-12
-K
-V
-L
-W
-13
QTY
NAME
DESCRIPTION
MATERIAL
SIZE OF MATERIAL
AUTHORITY
DRAWING NO
SYM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
DRAWN B. J. Rothe 5/24/76
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
DATE
USED ON
NATIONAL AERONAUTICS SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV 0
AUTHORITY
SHEET 16 OF 25

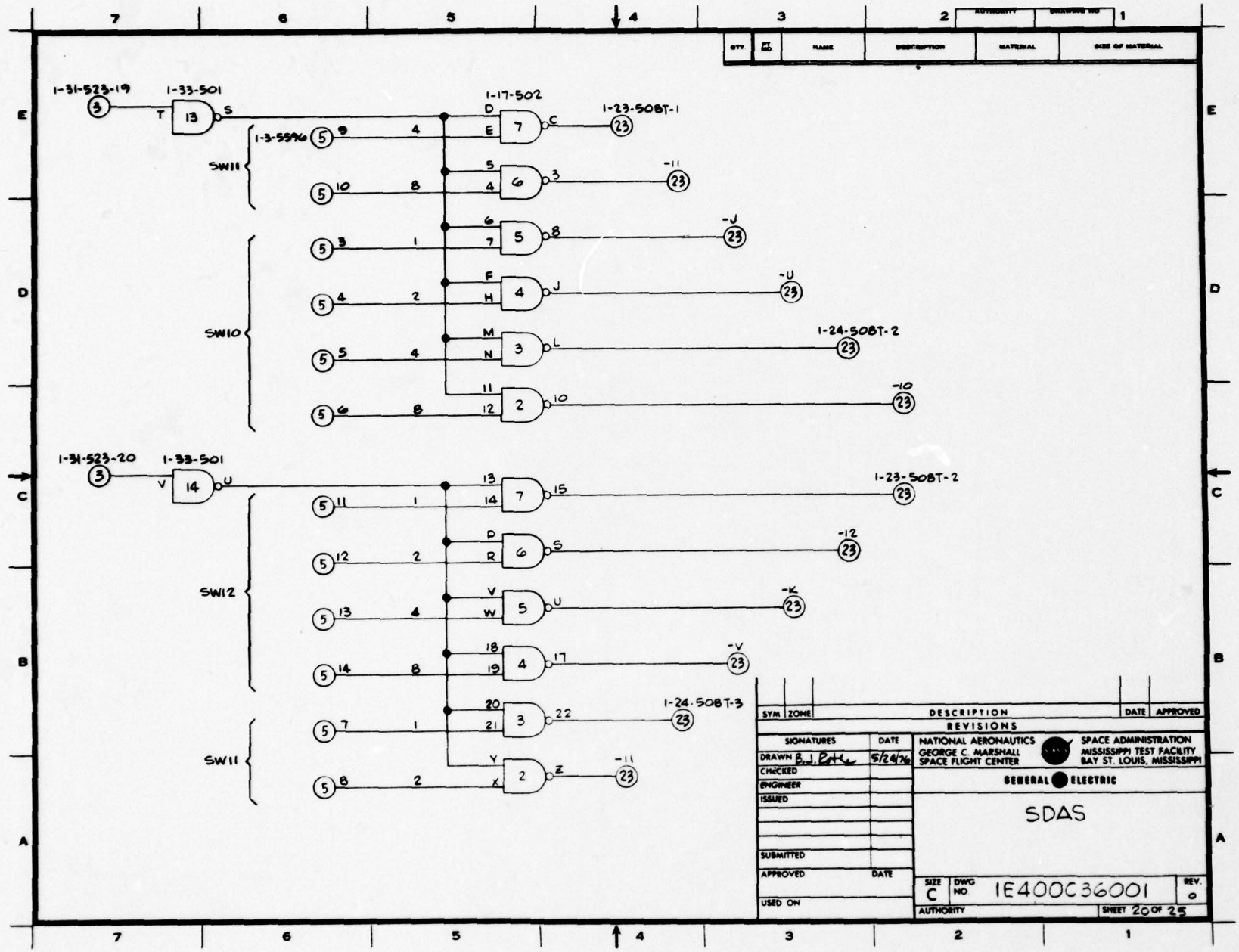

1-31-523-8
1-33-501
1-14-502
1-20-508T-2
SAMPLE LENGTH SW2
1-6-501
SAMPLE RATE SW1
1-21-508T-2
1-31-523-13
1-33-501
1-20-508T-1
SAMPLE DELAY SW3
1-21-508T-1
SAMPLE LENGTH SW2
QTY
PT NO.
NAME
DESCRIPTION
MATERIAL
SIZE OF MATERIAL
AUTHORITY
DRAWING NO
SYM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
DRAWN B. J. Lothe 5/28/76
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
USED ON
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV. 0
AUTHORITY
SHEET 17 OF 25



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV 0
SHEET 18 OF 25
SIGNATURES
DRAWN
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
USED ON
AUTHORITY
DATE
5/28/76
SYM
ZONE
DESCRIPTION
REVISIONS
DATE
APPROVED
1-15-502
1-33-501
1-31-523-14
1-31-523-15
2-6-501A
1-21-508T-K
1-21-508T-L
1-22-508T-3
1-22-508T-4
SW5
SW4
SW6
SW5


1-31-523-16
1-33-501
1-16-502
1-21-50BT-M
1-1-5596
SW8
1-22-50BT-5
2-6-501A
SW7
-V
-14
-M
-X
1-31-523-18
1-33-501
1-21-50BT-N
1-1-5596
SW9
-Y
1-22-50BT-6
-15
SW8
-N
-Y
SYM ZONE DESCRIPTION DATE APPROVED
REVISIONS
SIGNATURES DATE
DRAWN B. J Roth 5/24/76
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED DATE
USED ON
NATIONAL AERONAUTICS SPACE ADMINISTRATION
GEORGE C. MARSHALL MISSISSIPPI TEST FACILITY
SPACE FLIGHT CENTER BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV 0
AUTHORITY
SHEET 19 OF 25

77



SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
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CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI

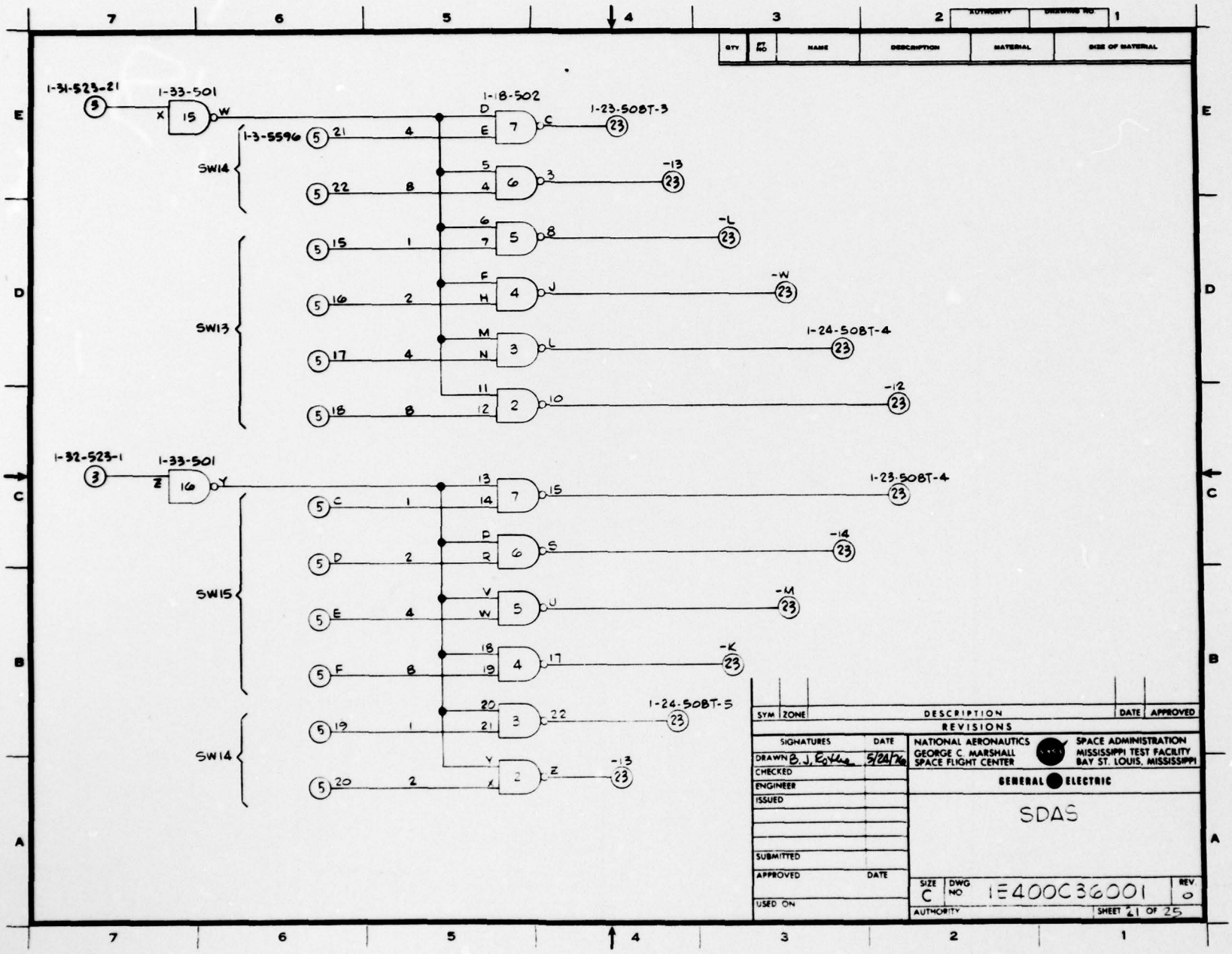
GENERAL ELECTRIC

SDAS

SIZE C | DWG NO 1E400C36001 | REV. 0

AUTHORITY | SHEET 20 OF 25

79



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SYM	ZONE	DESCRIPTION	DATE	APPROVED

REVISIONS

SIGNATURES	DATE
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CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI

GENERAL ELECTRIC

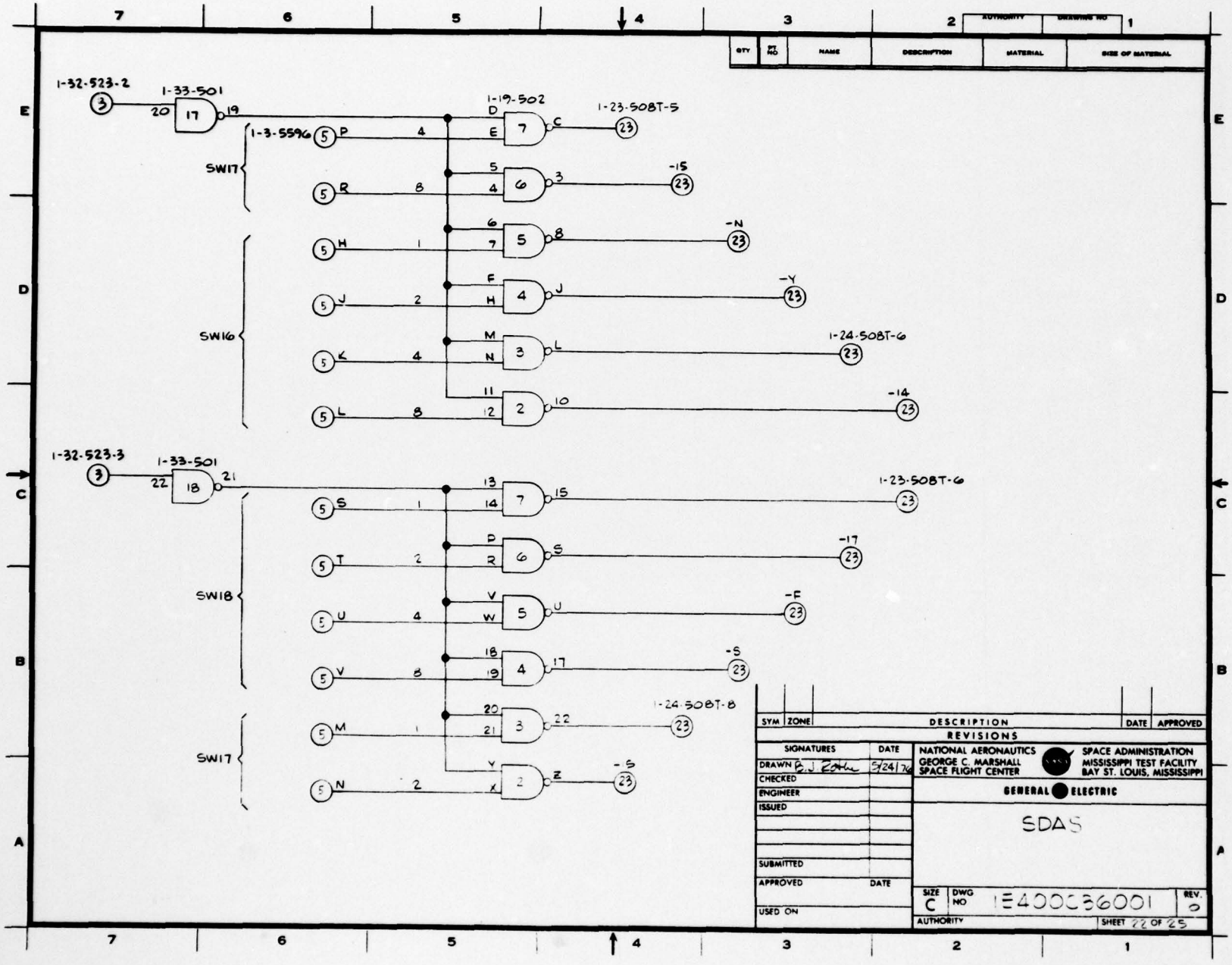
SDAS

SIZE C | DWG NO 1E400C36001 | REV 0

AUTHORITY

SHEET 21 OF 25

81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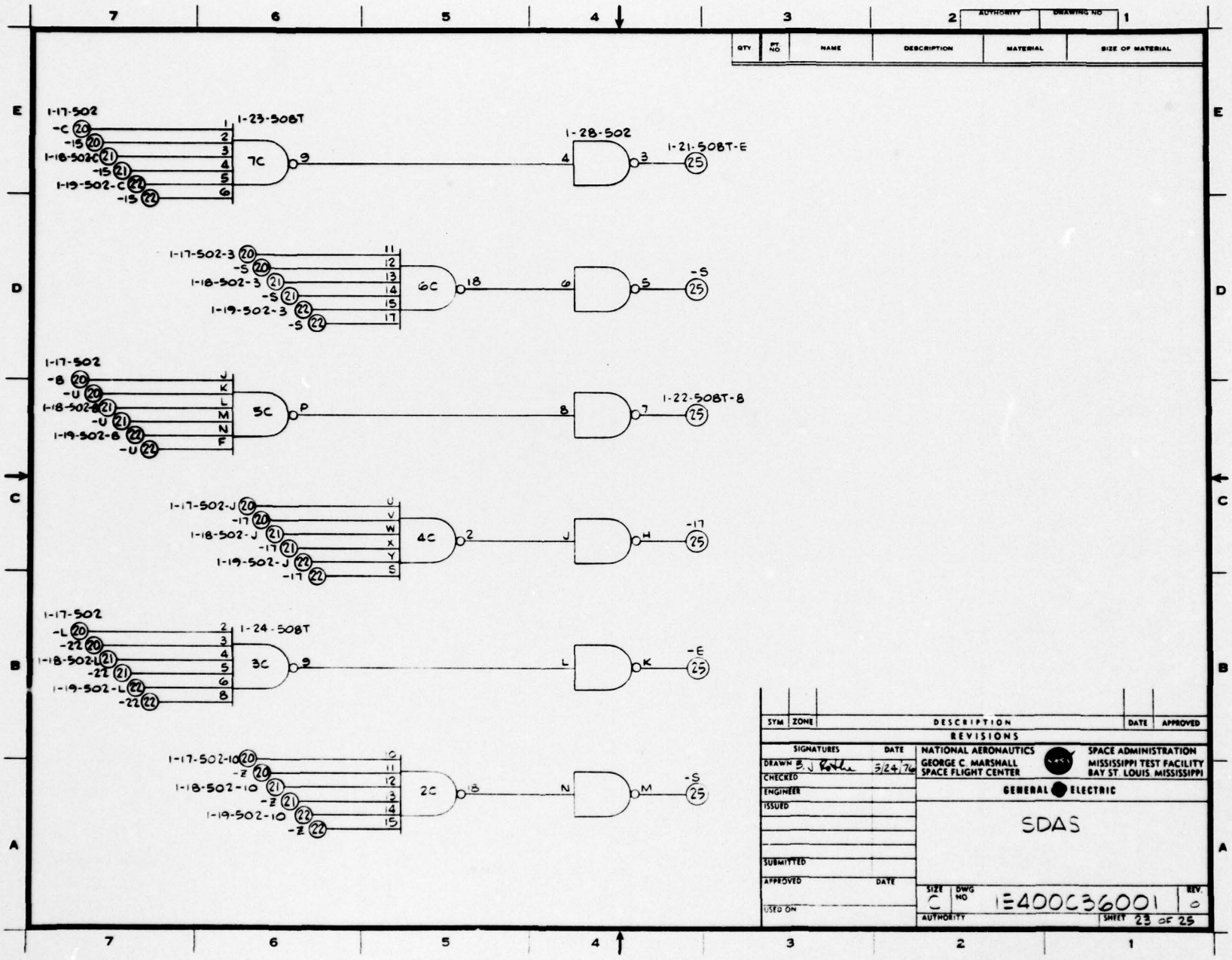
1-33-501
1-19-502
1-23-508T-5
1-3-5596
SW17
SW16
1-24-508T-6
1-32-523-3
1-23-508T-6
SW18
SW17
1-24-508T-8
-15
-N
-Y
-14
-17
-F
-S
-S
DESCRIPTION
REVISIONS
SIGNATURES
DRAWN
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
USED ON
NATIONAL AERONAUTICS SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV. D
SHEET 22 OF 25


AUTHORITY
DRAWING NO
QTY
ST NO
NAME
DESCRIPTION
MATERIAL
SIZE OF MATERIAL
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-15
1-18-502-C
-15
1-19-502-C
-15
1-23-50BT
7C
1-28-502
1-21-50BT-E
1-17-502-3
-S
1-18-502-3
-S
1-19-502-3
-S
6C
-S
1-17-502
-B
-U
1-18-502-B
-U
1-19-502-B
-U
5C
1-22-50BT-B
1-17-502-J
-17
1-18-502-J
-17
1-19-502-J
-17
4C
-17
1-17-502
-L
-22
1-18-502-L
-22
1-19-502-L
-22
1-24-50BT
3C
-E
1-17-502-10
-Z
1-18-502-10
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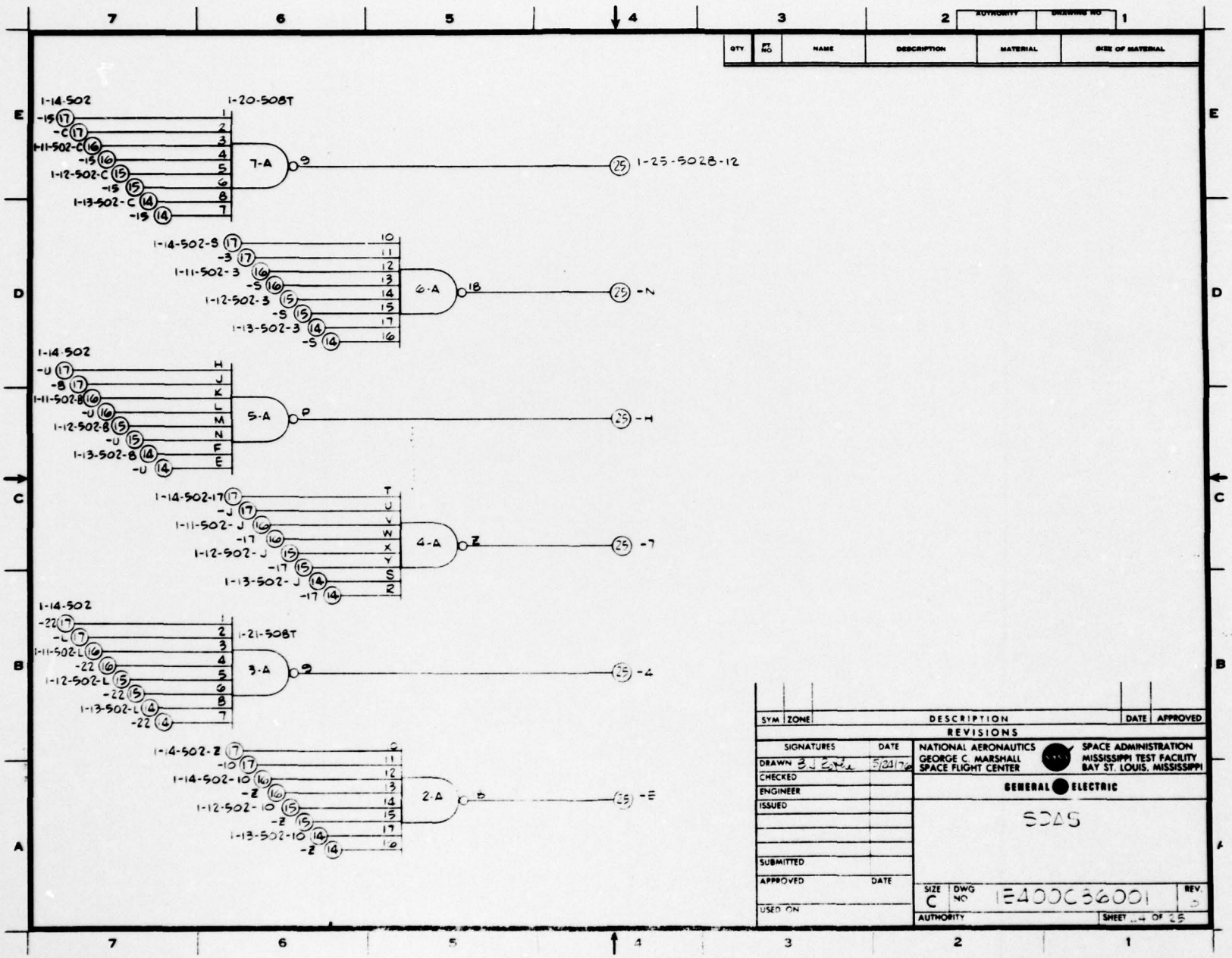
1-19-502-10
-Z
2C
-S
SYM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
DRAWN B. J. Fowler 3/24/76
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
DATE
USED ON
NATIONAL AERONAUTICS SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV. 0
AUTHORITY
SHEET 23 OF 25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6
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QTY
PT NO
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SIZE OF MATERIAL
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-15 17
-C 17
1-11-502-C 16
-15 16
1-12-502-C 15
-15 15
1-13-502-C 14
-15 14
1-20-508T
1
2
3
4
5
6
8
7
7-A
9
25
1-25-5028-12
1-14-502-S 17
-3 17
1-11-502-3 16
-S 16
1-12-502-3 15
-S 15
1-13-502-3 14
-S 14
10
11
12
13
14
15
17
16
6-A
18
29
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-B 17
1-11-502-B 16
-U 16
1-12-502-B 15
-U 15
1-13-502-B 14
-U 14
H
J
K
L
M
N
F
E
5-A
P
25
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1-14-502-17 17
-J 17
1-11-502-J 16
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1-12-502-J 15
-17 15
1-13-502-J 14
-17 14
T
U
V
W
X
Y
S
R
4-A
Z
25
-T
1-14-502
-22 17
-L 17
1-11-502-L 16
-22 16
1-12-502-L 15
-22 15
1-13-502-L 4
-22 4
1-21-508T
2
3
4
5
6
8
7
3-A
9
25
-4
1-14-502-Z 17
-10 17
1-14-502-10 16
-Z 16
1-12-502-10 15
-Z 15
1-13-502-10 14
-Z 14
9
11
12
13
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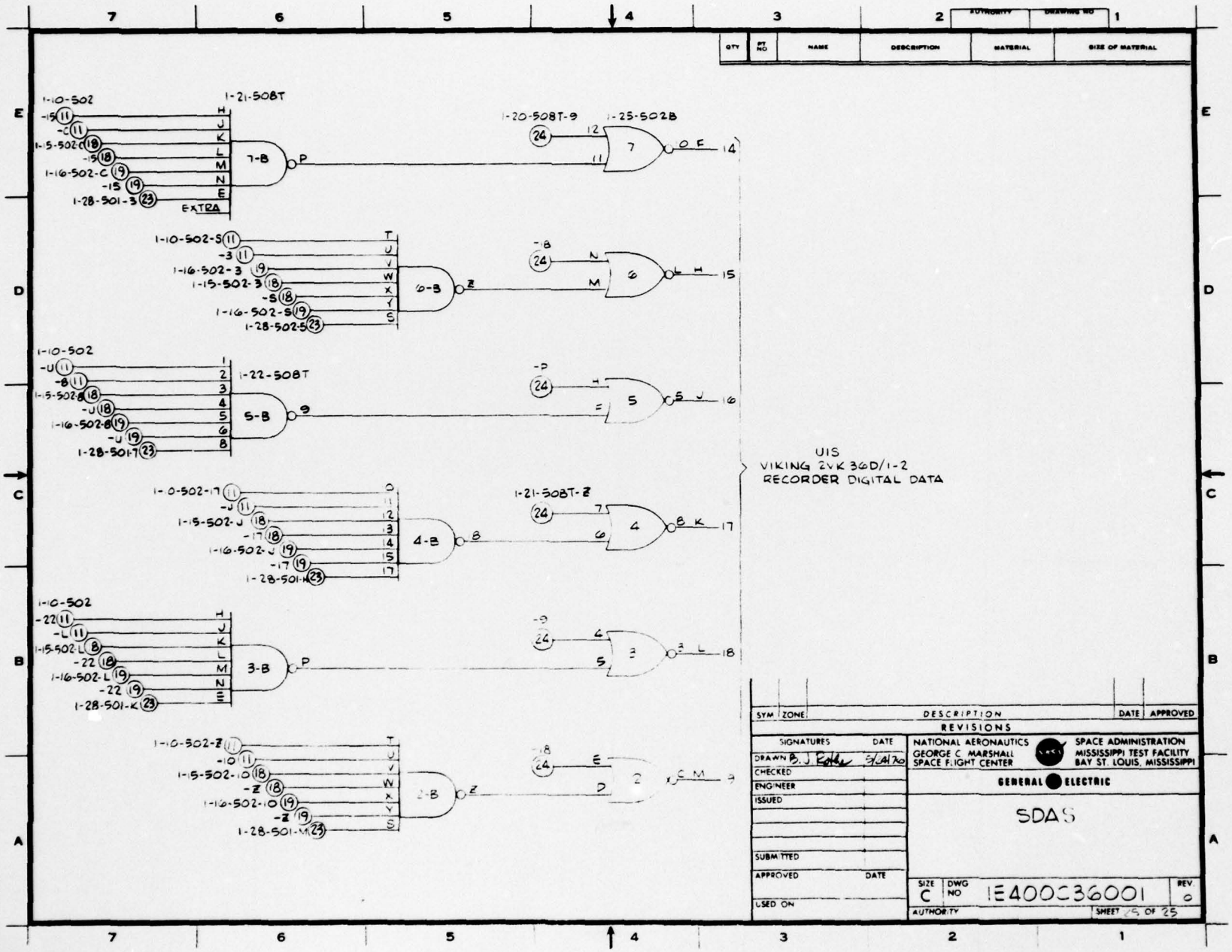
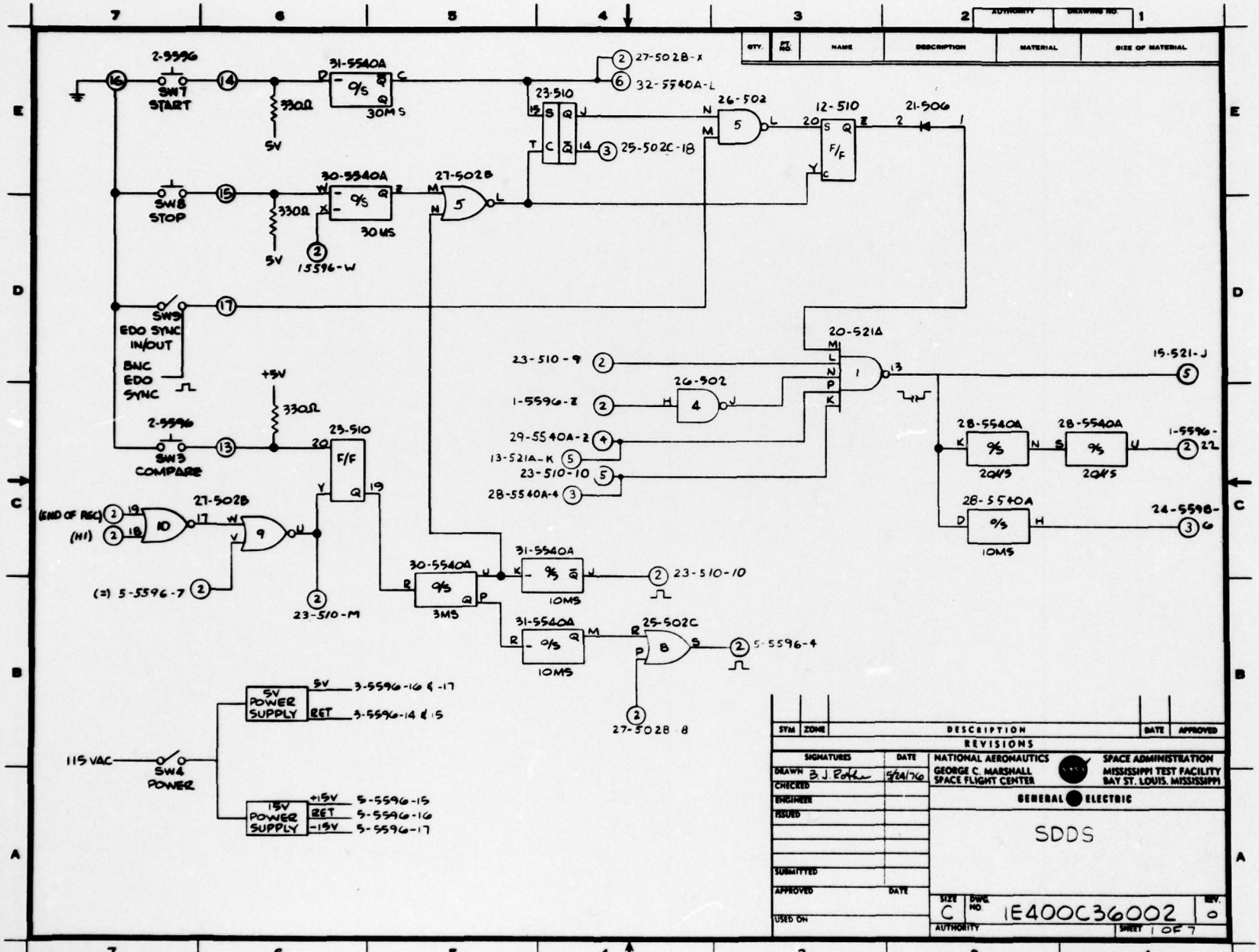
15
17
16
2-A
B
25
-E
SYM
ZONE
DESCRIPTION
DATE
APPROVED
REVISIONS
SIGNATURES
DATE
DRAWN
5/23/72
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED
DATE
USED ON
NATIONAL AERONAUTICS
GEORGE C. MARSHALL
SPACE FLIGHT CENTER
SPACE ADMINISTRATION
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE
C
DWG NO
IE400C36001
REV
AUTHORITY
SHEET 4 OF 25

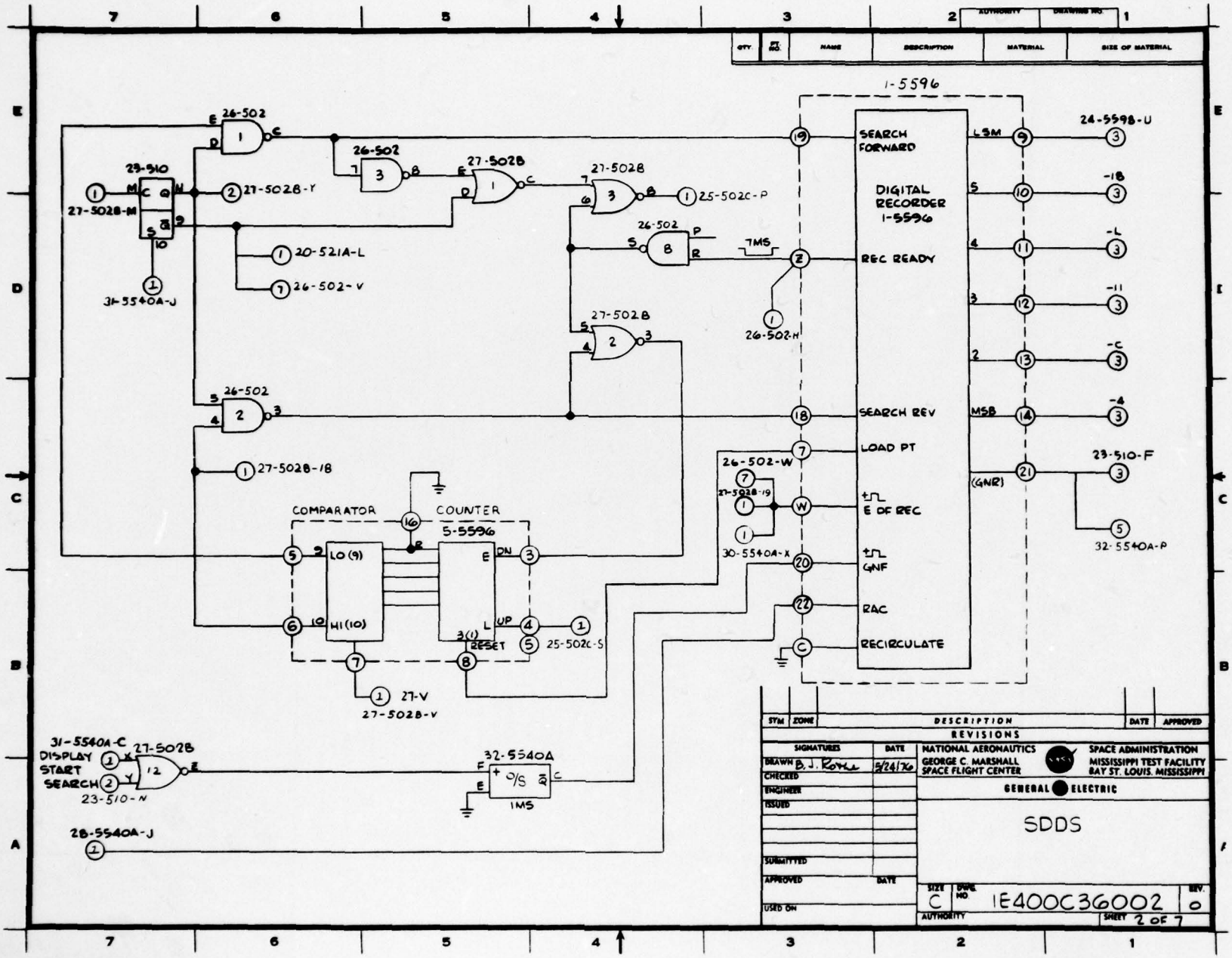

1-10-502
1-21-508T
1-20-508T-9
1-25-502B
7-B
1-10-502-S
1-16-502-3
1-15-502-3
1-28-502-5
6-B
1-10-502
1-22-508T
1-28-501-T
5-B
1-0-502-17
1-15-502-J
1-16-502-J
1-28-501-K
4-B
1-21-508T-Z
1-10-502-Z
1-15-502-10
1-16-502-10
1-28-501-M
2-B
UIS
VIKING 2VK 36D/1-2
RECORDER DIGITAL DATA
SYM ZONE DESCRIPTION DATE APPROVED
REVISIONS
SIGNATURES DATE
DRAWN B. J. Fobler 5.21.70
CHECKED
ENGINEER
ISSUED
SUBMITTED
APPROVED DATE
USED ON
NATIONAL AERONAUTICS SPACE ADMINISTRATION
GEORGE C MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDAS
SIZE C
DWG NO 1E400C36001
REV 0
AUTHORITY
SHEET 25 OF 25

APPENDIX B

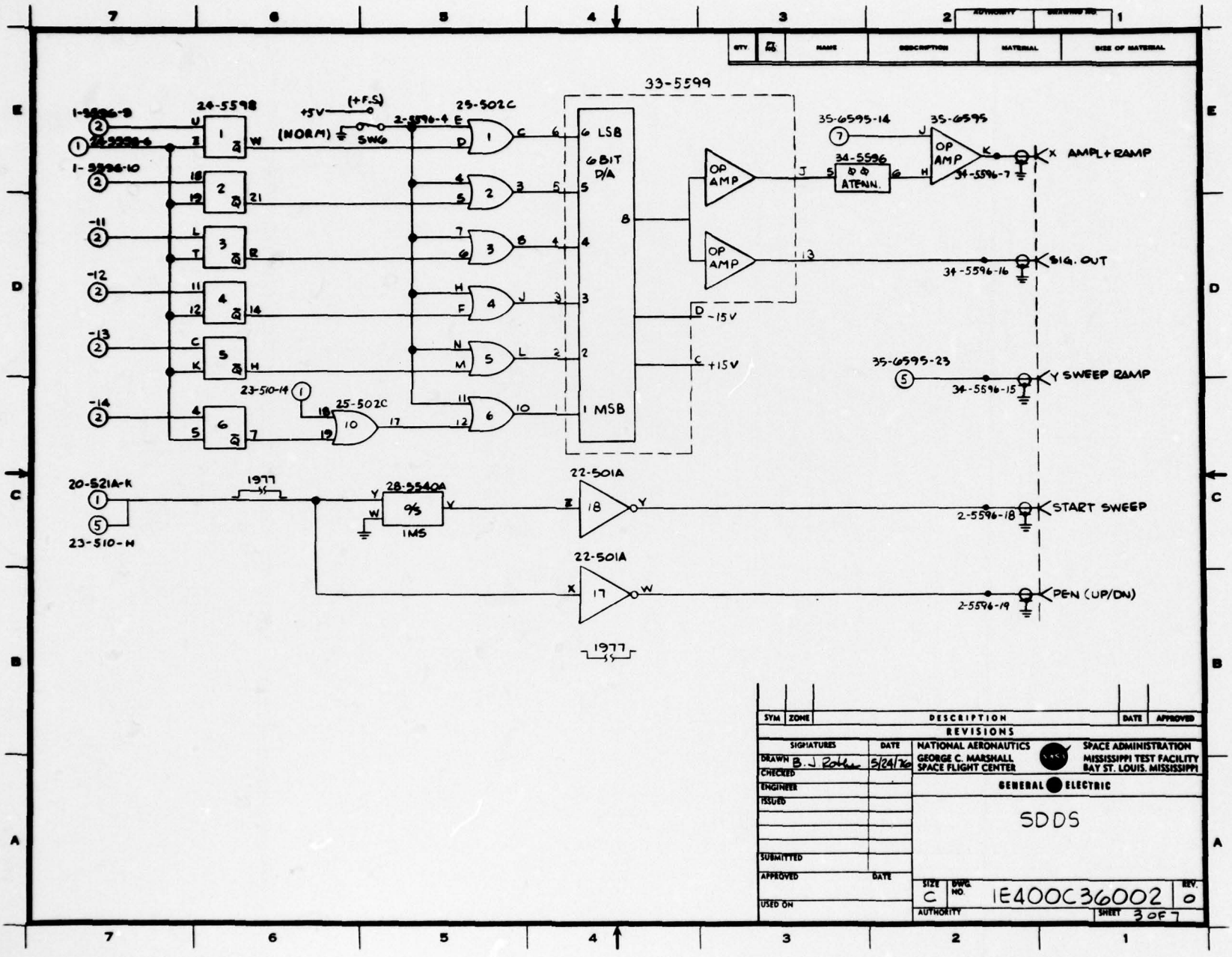
SCHEMATICS

SEISMIC DATA DISPLAY SYSTEM
(SDDS)


SW7 START
SW8 STOP
SW9 EDO SYNC IN/OUT
BNC EDO SYNC
SW3 COMPARE
SW4 POWER
330Ω
5V
+5V
31-5540A
30-5540A
23-510
26-502
12-510
21-506
27-502B
20-521A
25-502C
28-5540A
30MS
30 MS
20MS
10MS
3MS
F/F
5V POWER SUPPLY
15V POWER SUPPLY
115 VAC
(END OF REC)
(HI)
SDDS
IE400C36002
SPACE ADMINISTRATION
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GEORGE C. MARSHALL SPACE FLIGHT CENTER
GENERAL ELECTRIC
DRAWN B. J. Poke 5/24/76
SIZE C
SHEET 1 OF 7


1-5596
DIGITAL RECORDER 1-5596
SEARCH FORWARD
REC READY
SEARCH REV
LOAD PT
E OF REC
GNF
RAC
RECIRCULATE
LSM
MSB
(GNR)
TMS
COMPARATOR
COUNTER
5-5596
LO (9)
HI (10)
UP
DN
RESET
26-502
27-5028
29-510
24-5598-U
23-510-F
32-5540A-P
26-502-W
27-5028-19
30-5540A-X
20-521A-L
26-502-V
27-5028-M
31-5540A-J
26-502-N
27-5028-18
25-502C-P
25-502C-S
27-V
27-5028-V
31-5540A-C
DISPLAY START SEARCH
23-510-N
28-5540A-J
32-5540A
1MS
SIZE C
DWG NO. 1E400C36002
REV. 0
SHEET 2 OF 7
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC
SDDS

95



SYM	ZONE	DESCRIPTION	DATE	APPROVED
		REVISIONS		

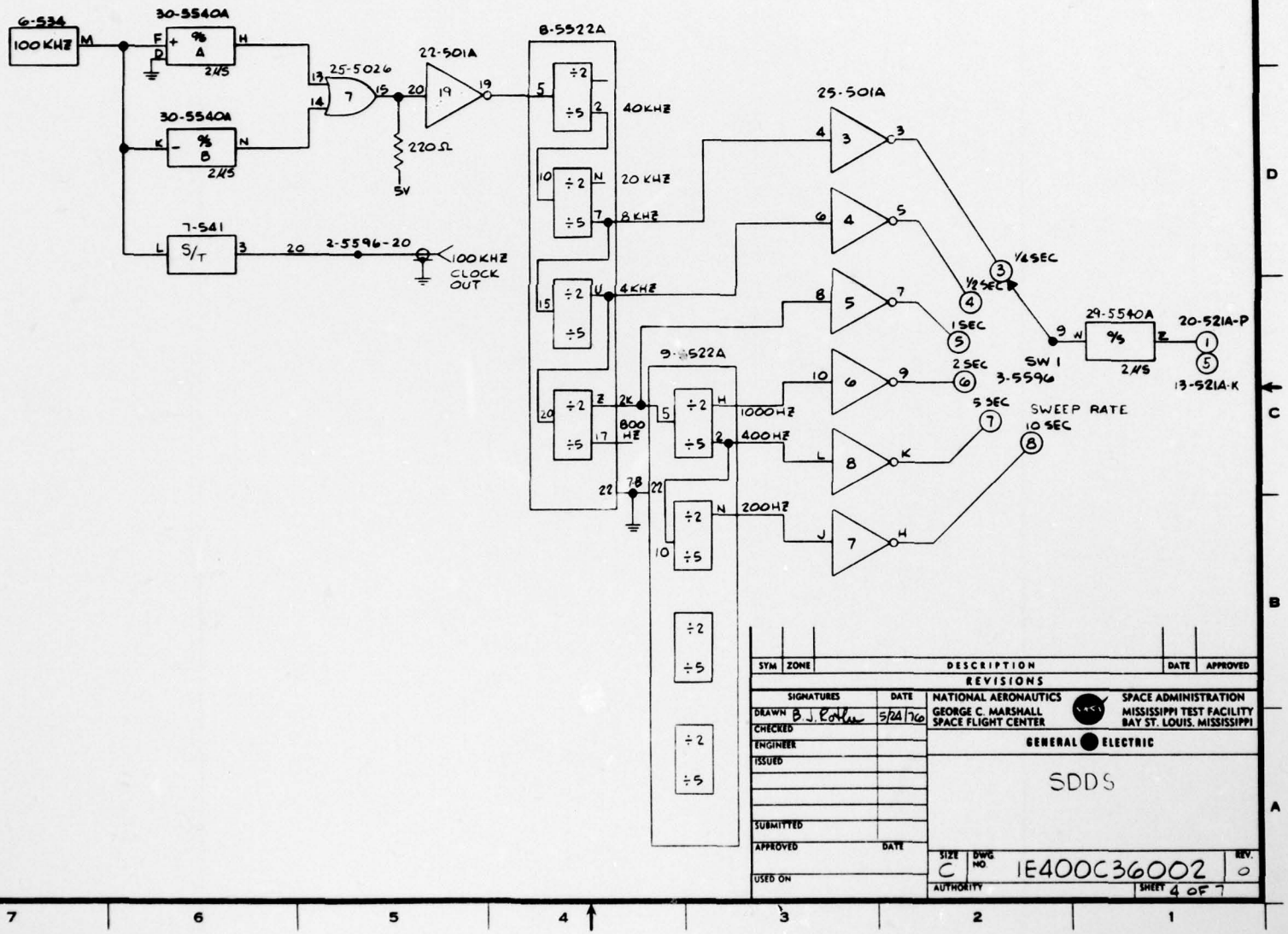
SIGNATURES	DATE
DRAWN B. J Robb	5/24/76
CHECKED	
ENGINEER	
ISSUED	
SUBMITTED	
APPROVED	DATE
USED ON	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MISSISSIPPI TEST FACILITY
BAY ST. LOUIS, MISSISSIPPI
GENERAL ELECTRIC

SDDS

SIZE C | DWG. NO. 1E400C36002 | REV. 0
AUTHORITY | SHEET 30F7

97



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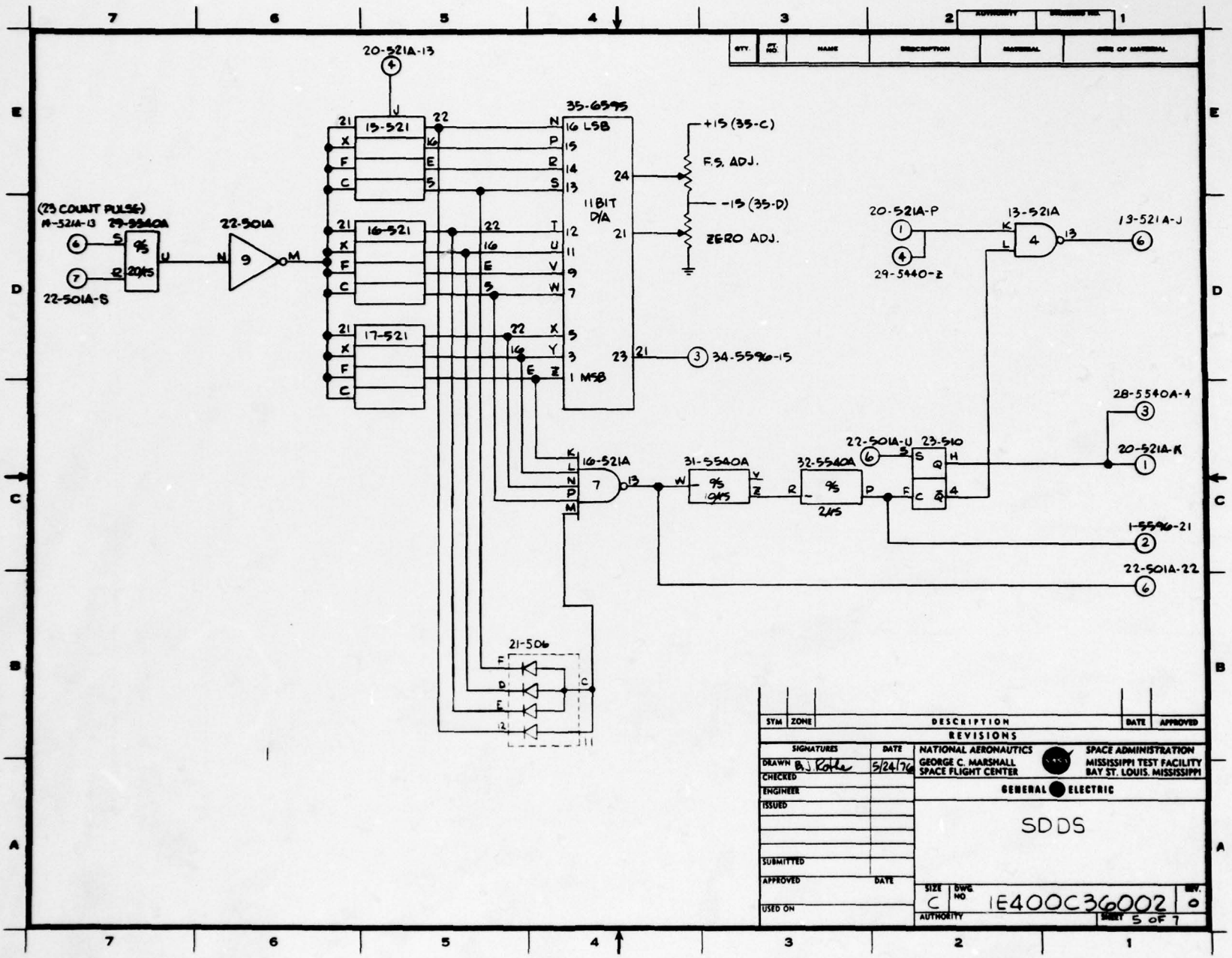

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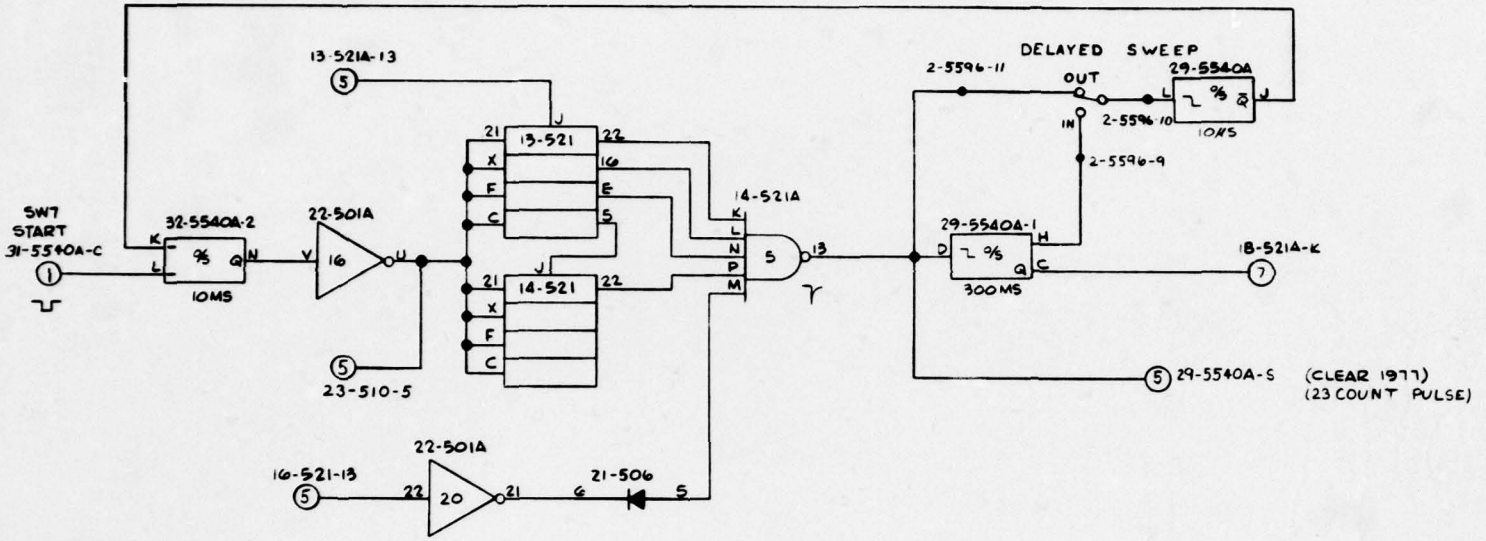

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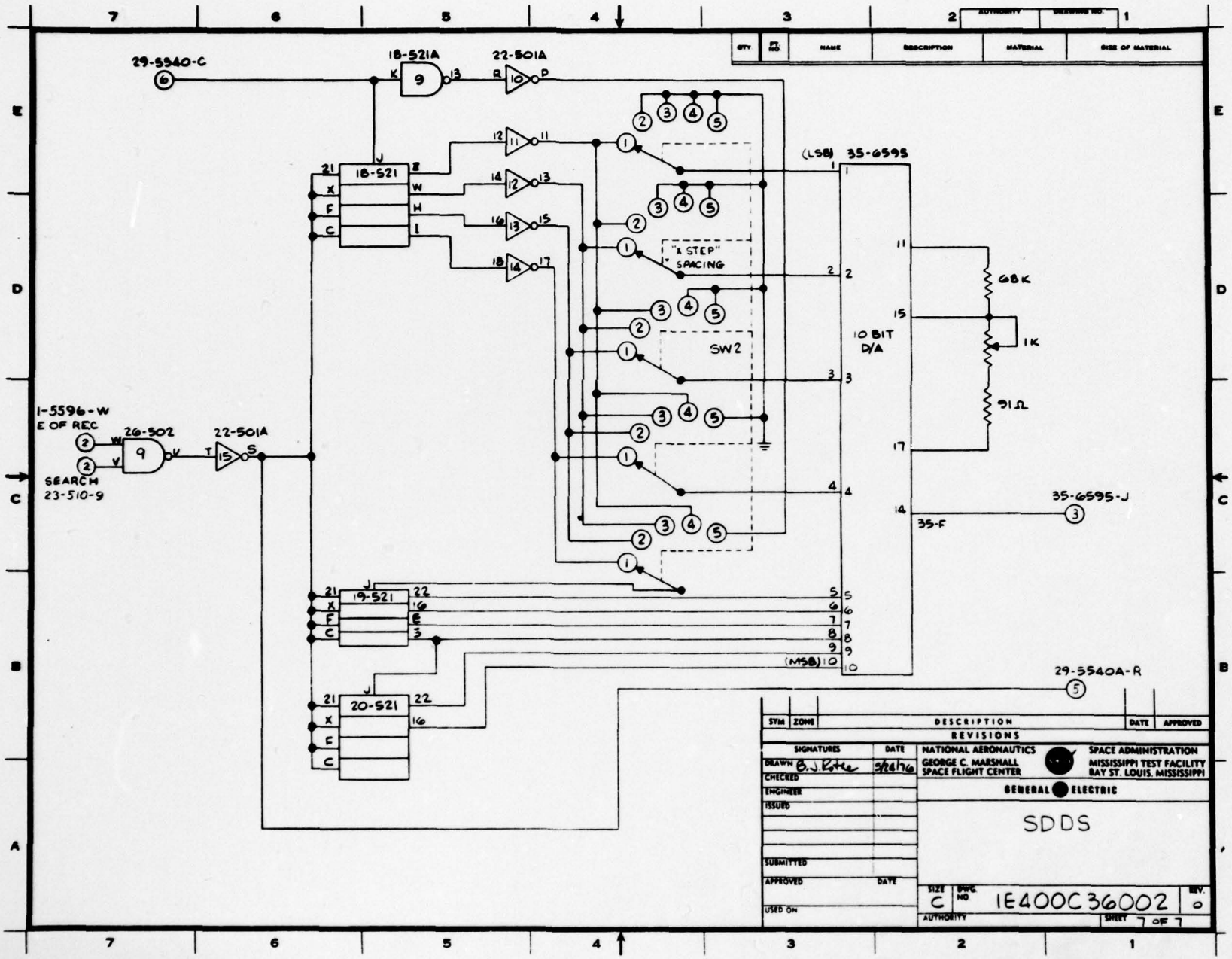
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This report is Volume III of a three volume final report series on the Marine Seismic Display Enhancement Program.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Marine seismic system, data acquisition, multi-channel digitizing, data display

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report describes, in a users handbook format, the operation of hardware systems used to acquire and playback seismic profiling data. The Seismic Data Acquisition System digitizes 1 to 16 channels of analog seismic information and records this data on magnetic tape. This digital data has a maximum dynamic range of 72 dB and maximum sample rate of 10 kHz divided by the number of channels. Record lengths up to 15 seconds with a maximum record delay, before digitizing, of 15 seconds may be selected.

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Maximum signal level for the system is ±10 volts. The Seismic Data Display System converts a 36 dB dynamic range digital signal to an analog signal having a maximum level of ±10 volts. The digital information displayed will contain 2000 data points per record. The system has the capability to display seismic data on a line scan intensity modulated recorder, an X-Y reocrder, or a high speed fiber optic recorder. Included as appendices are schematic diagrams of the acquisition and display hardware.